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ABSTRACT

This collection of classroom exercises was designed to maximize teacher time, while creating an awareness of our food and fiber system among New York third graders. The materials are color-coded, falling into four categories: language arts, mathematics, science, and social studies. Each exercise includes background information, concepts, and objectives for the teacher. The language arts series directs students to write descriptive paragraphs, to read, and to create a bulletin-board forest scene while learning about plants and animals. The mathematics section offers puzzles and word problems having to do with food and animals. Activities in the science section focus on plant and animal life studies, helping students to learn plant and animal parts and to understand the life cycle of honeybees. The social studies materials teach children the history of the horse's role in society. Another unit describes food production through history, including the Stone Age, early civilization, ancient Egypt, Europe, and the American colonies. Subjects also include the steam engine and modern farm machinery. The document offers word puzzles and line drawings for students to color. Additional resources include a booklet--"Bud's World"--on American agriculture and wildlife, a wall poster, a small coloring book, a booklet on wheat, and a U.S Department of Agriculture bibliography of 328 educational resources about agriculture. (TES)

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NEW YORK AGRICULTURE IN THE CLASSROOM

ED313207

Bud's World

Grade 3

RC017351

Ag in the CLASSROOM

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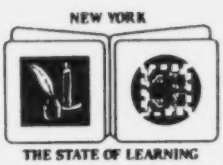

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NEW YORK AGRICULTURE IN THE CLASSROOM
Grade 3

by
Betty Wolanyk

DEDICATION

This work is dedicated to Sue Shanahan, for her optimism. Thanks, for your hard work, patience and dedication. You have been invaluable through this very difficult year.

Many thanks to Janet St. Pierre for her contributions, as well as to Carolyn Klass, Tina Winstead, Don Rakow, Marianne Krasny, Diane Phillips and Gary Goff for their assistance in reviewing these materials for technical accuracy.

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New York Agriculture in the Classroom

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September 1, 1988

Dear Educator:

These materials have been designed to maximize teacher time, address the concepts in the syllabus for each subject area and create an awareness of our food and fiber system. A conscious effort has been made to develop materials that were active in nature. The old adage: "Tell me, I'll forget; show me, I may remember; but, involve me, and I'll understand" has been our philosophy in developing these materials.

As you no doubt have already noticed, the materials are color coded. All teacher materials and answer keys are color-coded as follows:

pink.....Language Arts
yellow.....Mathematics
green.....Science
blue.....Social Studies
Student materials are white to eliminate problems in copying.

In the top, right-hand corner of each page is the major concept covered by that activity. Other concepts are indicated on the Teacher Material pages. The Language Arts materials also indicate which syllabus (of the five) was used. Science concepts are listed by the major subject area heading. At the time this work was done, some of the syllabi were under revision. If this was the case, either the old syllabus or the draft of the new one was used. Adjustments will have to be made after the revised syllabus is made available.

It is crucial for you to understand that these materials are not intended to add to the curriculum. They simply offer a way to meet the concepts in the syllabus.

Thank you. Good luck with your efforts. I hope that you find these materials useful and enjoyable.

Sincerely,

Betty Wolanyk

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TEACHER MATERIALS

CONCEPTS:

Composition	- to describe
	- grammar
	- spelling
	- punctuation
Library Skills	
Social Studies	- environment
Life Science	- III B - 1

OBJECTIVES:

1. The students will correctly write a paragraph describing a plant or animal which lives in the forest.

2. The students will begin to obtain library skills (encyclopedia).

3. The students will begin to appreciate the complexity of our natural world.

BACKGROUND: Forests are crucial for the survival of mankind on the earth. This lesson will begin to develop within the students an appreciation for how complex the forest is. An interdependence of plants, animals and mankind should be apparent.

ACTIVITIES:

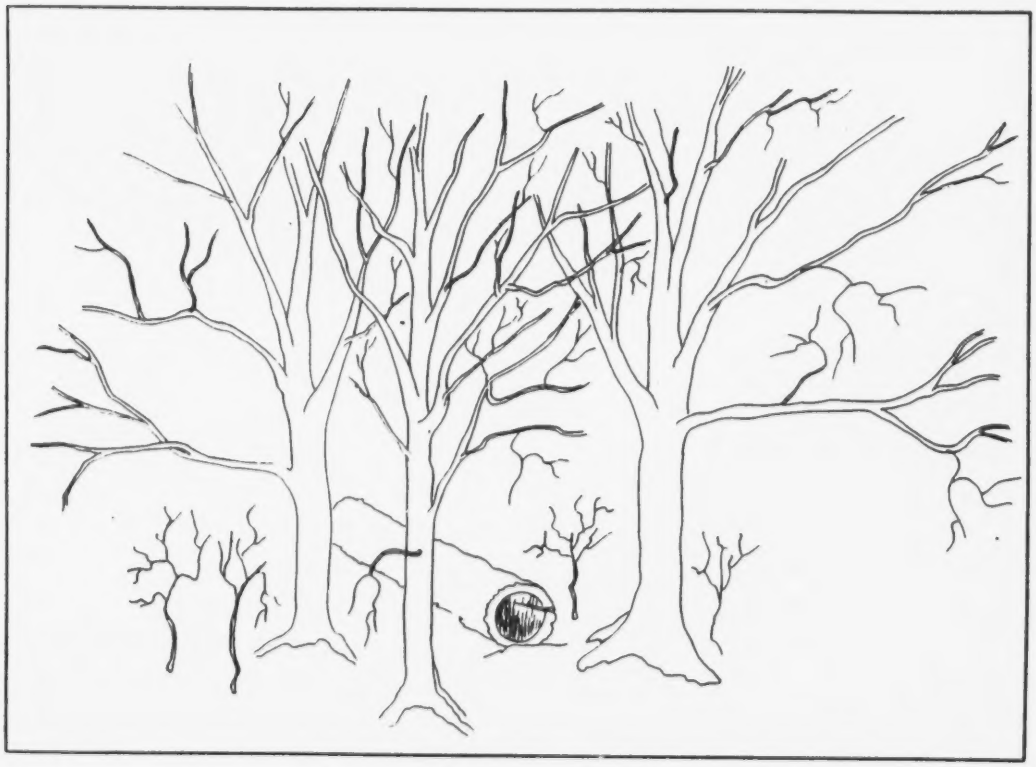
1. After reading pages 6 and 7 in "*Bud's World* ", brainstorm with the students to determine what lives in the forest. Make a list on the blackboard.

2. Have each student select one of the items, look it up in an encyclopedia and write a paragraph describing it. Ask them to write in complete sentences, spell the words correctly and use proper grammar. The paragraph should include: the color of the animal, where it makes

its home, and one food it likes. If the students select a plant, have them include: when it blooms, the color of its flowers and any interesting traits - i.e., poisonous.

3. "Make a Forest"

   a. On your bulletin board (or a hallway or classroom wall) make tree trunks, fallen logs and young trees from brown and green construction paper. Draw lines to give the logs and the tree trunks texture. Make one hollow log, and one hollow tree.



   b. Have the students collect fallen leaves from the school grounds, park, or their home area.

      or

Make leaves by copying these drawings. Have the students cut them out and color them in with crayons or paint.

c. Staple or paste the leaves on the trees.

d. Either have the students draw their own animals and plants or enlarge the accompanying pages by making a transparency of these pages and projecting pictures onto white paper. The students may then trace their animals and color them correctly. The pictures provided are drawn to scale on each page.

e. Have the students "assemble the forest".

f. Place the students' paragraphs near the appropriate animal or plant.

4. a. Make a transparency of "What We Get From Forests".

b. Show it to the students.

c. Discuss with the class the information on the transparency.

d. Have the students relate their own experiences in a park or forest area.

5. Use the Arbor Day application to obtain more tree information.

6. Plant a tree for Arbor Day.

7. Use the poster *Growth of a Tree.*

Composition

Name_____ Date_____

Animals

Name of animal_____

Colors_____

Where does it make its home? _____

_____

_____

What kind of food does it eat? _____

_____

_____

_____

What are its enemies?_____

_____

_____

Name_____ Date_____

Plants

Name of plant - _____

Color of plant - _____

Does it bloom? _____

What is the color of its flowers? _____

_____

_____

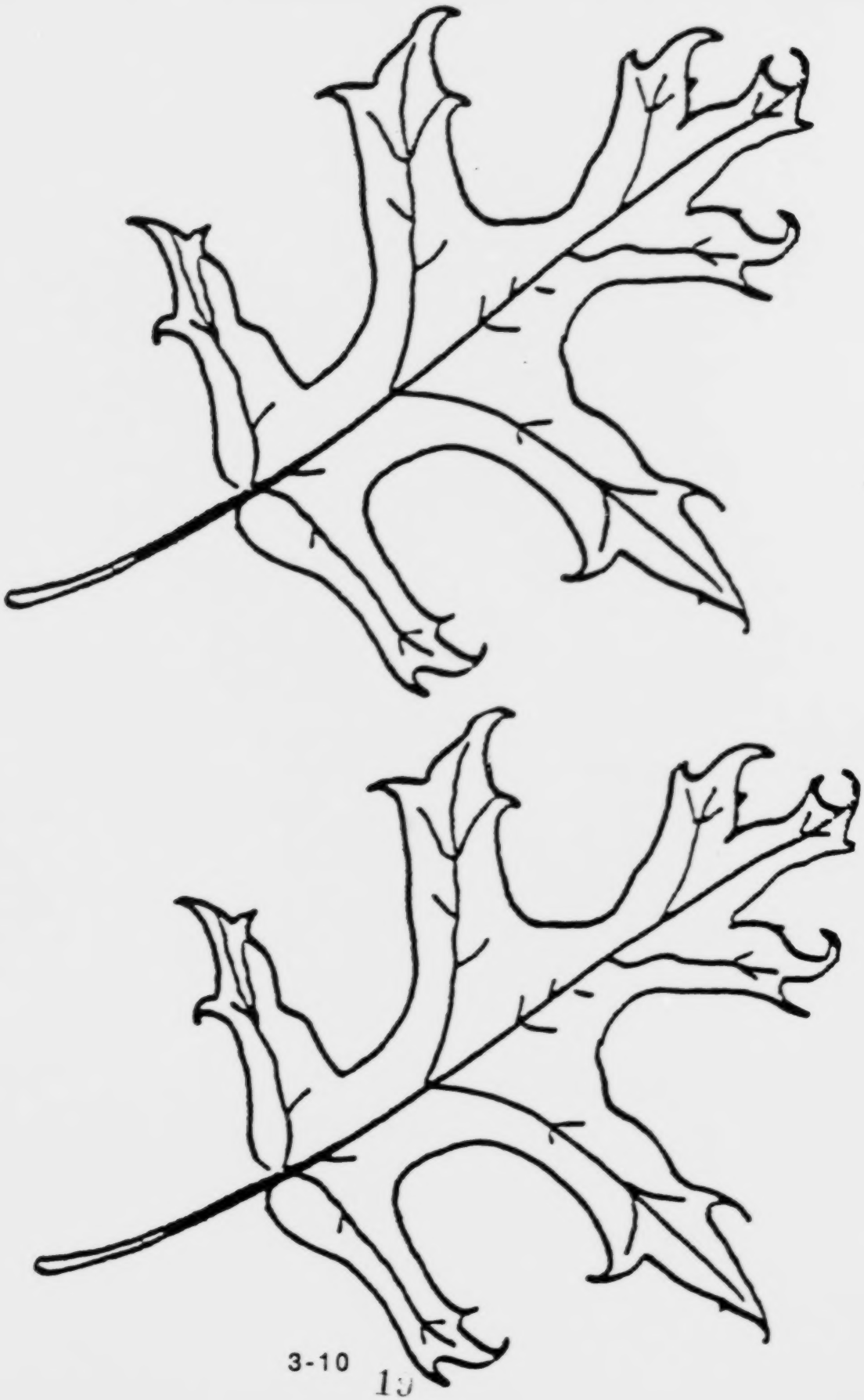
Does it have any interesting traits?_____

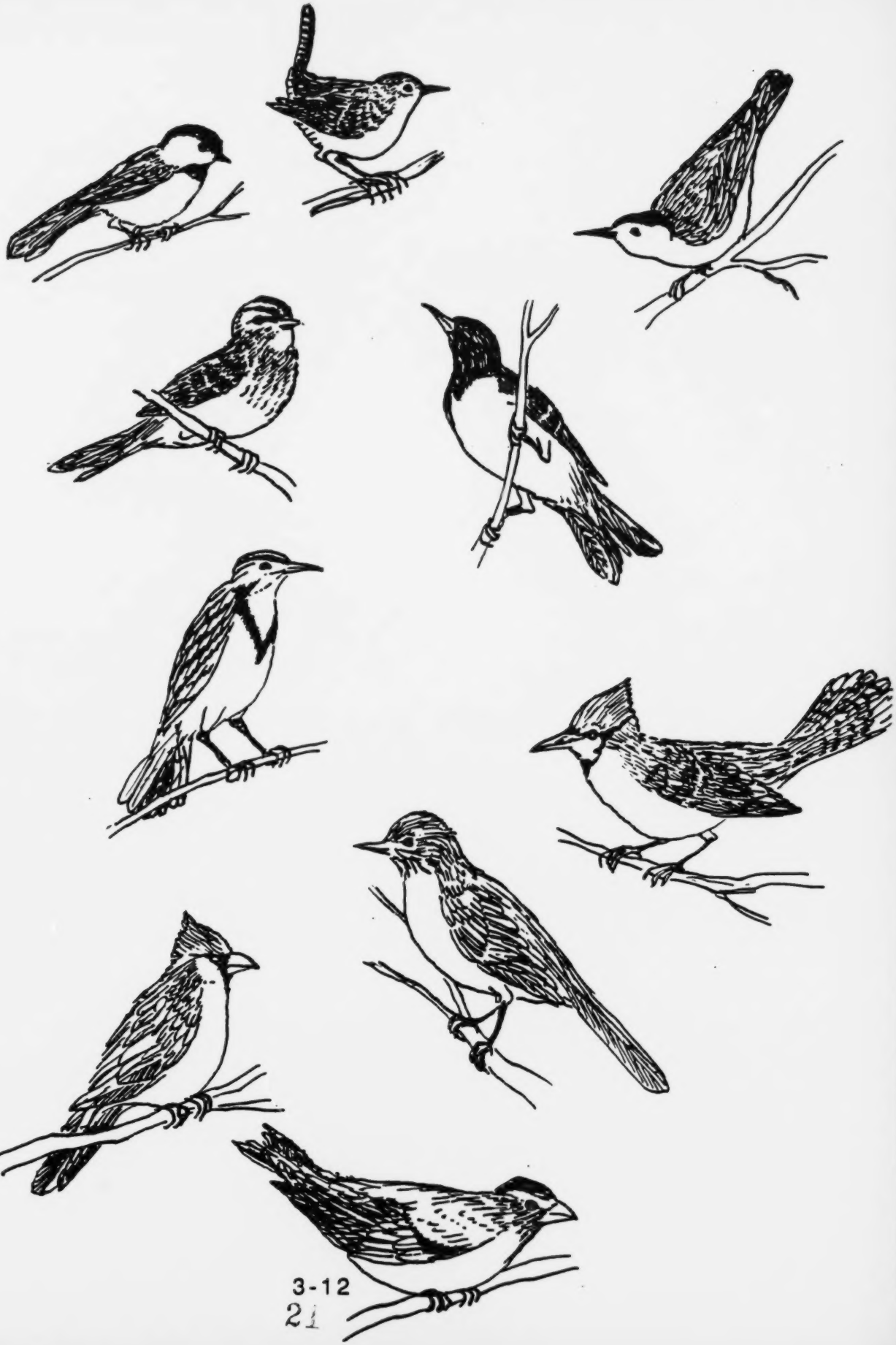
_____

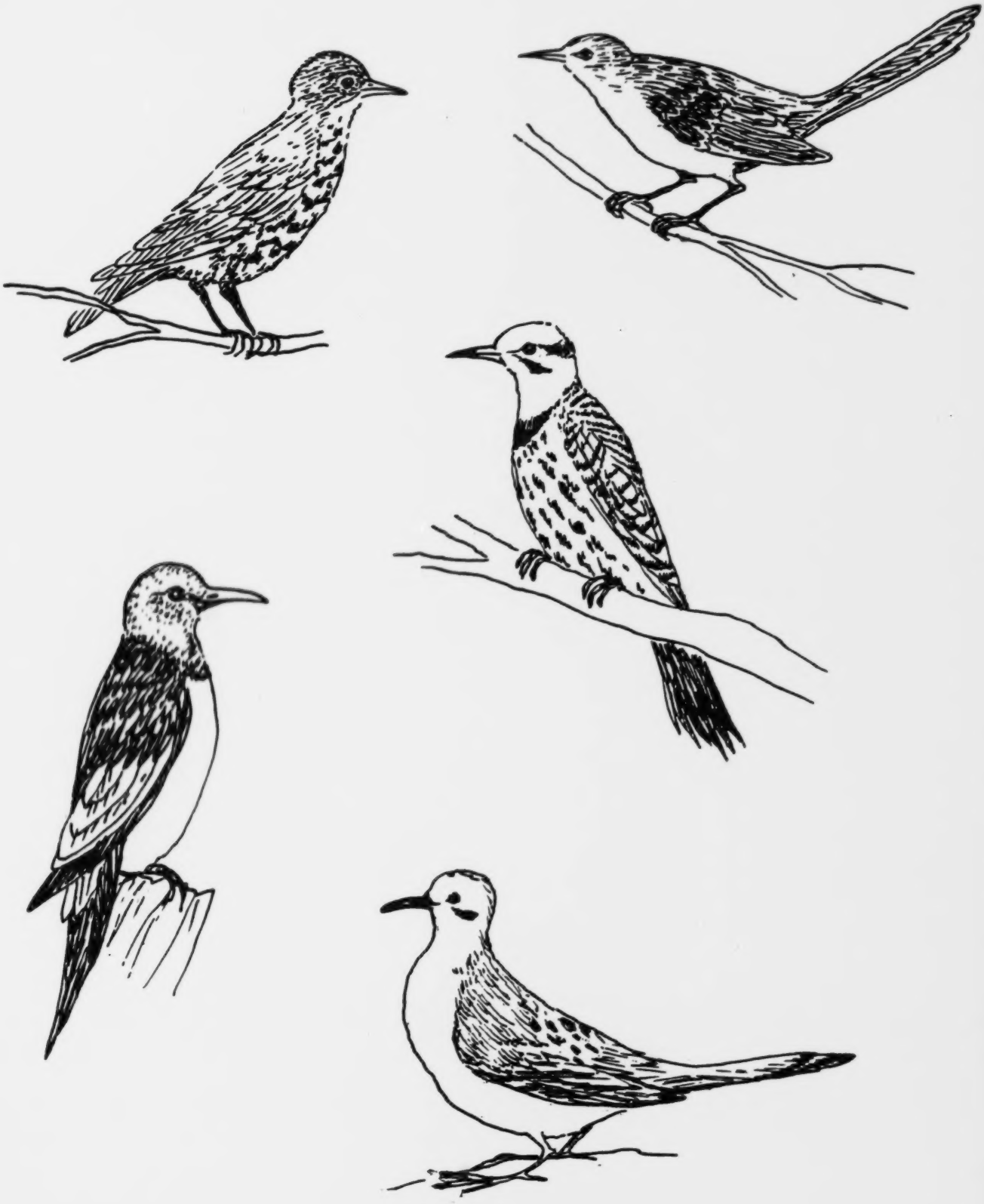
_____

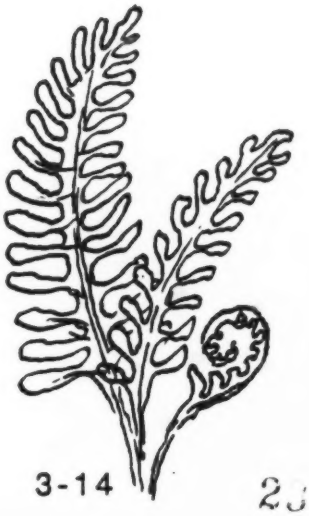
_____

_____

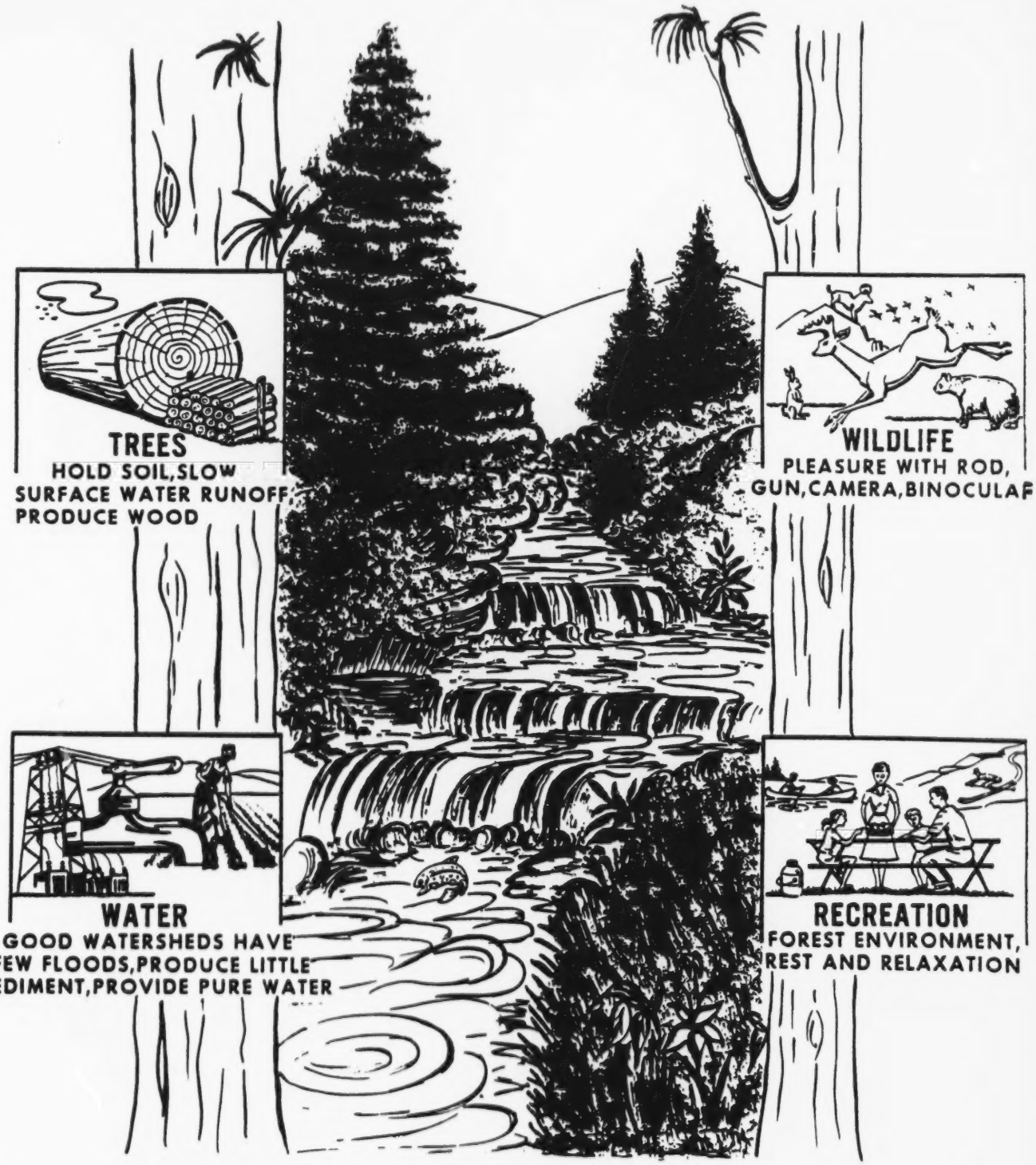








WHAT WE GET FROM FORESTS



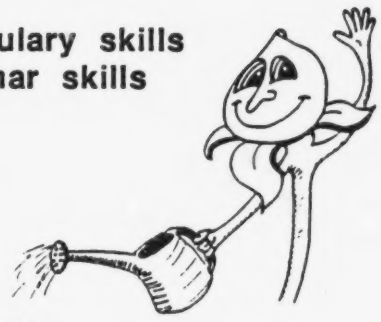
TREES
HOLD SOIL, SLOW SURFACE WATER RUNOFF, PRODUCE WOOD

WILDLIFE
PLEASURE WITH ROD, GUN, CAMERA, BINOCULAR

WATER
GOOD WATERSHEDS HAVE FEW FLOODS, PRODUCE LITTLE SEDIMENT, PROVIDE PURE WATER

RECREATION
FOREST ENVIRONMENT, REST AND RELAXATION

Language
- **vocabulary skills**
- **grammar skills**



TEACHER MATERIALS

CONCEPTS: Language
- vocabulary
- spelling
- grammar skills

OBJECTIVES:

1. The students will expand their vocabulary and think creatively.
2. The students will use complete sentences in writing.
3. The students will be able to spell these words accurately.

ACTIVITIES:

1. Have the student complete the word find on page 16 in "*Bud's World* ".
2. Have the students complete the accompanying worksheet and define words on page 16 of "*Bud's World* " by using a dictionary.
3. Have the students develop their own crossword puzzle, bubblegram, word scramble or word-find using those words and definition. (The use of graph paper makes it easier for the students.)
4. Have the students develop more words which are a part of the food and fiber system.
5. Using some of those words, have the students complete a creative writing activity.
6. Use the words as additions to the spelling lists.

Name _____ Date_____

Define these words by looking them up in a dictionary:

Farms-_____

Fauna-_____

Feathers-_____

Fiber-_____

Fields-_____

Fish-_____

Flavoring-_____

Flora-_____

Flowers-_____

Food-_____

Forests-_____

Fuel-_____

Fur-_____

TEACHER MATERIALS

CONCEPTS:

Composition	-	to explain
Language	-	vocabulary
	-	grammar
	-	spelling
	-	punctuation
Life Science II A	-	1.1 Life Cycle

OBJECTIVE: The student will write a description of the life cycle of the rose using the key words provided.

BACKGROUND: Although most roses are commercially grown from cuttings, breeding new roses depends upon seed. Pollination of the flower is done by hand from a chosen "mate". The seeds are then planted. New roses are selected from these planned breedings.

The *rose* is our State Flower in New York.

ACTIVITIES:

1. Complete the lessons on the flower, pollinators and honeybees in science before conducting this activity.

2. Have the students describe the life cycle of the rose as seen on pages 34 and 35 of "*Bud's World*" by writing a composition called "The Life Cycle of the Rose".

3. Make rose hip tea for the students - or a tea with rose hips in the ingredients.

4. Research the rose as our New York State flower and share the information with the students.

Name_____ Date_____

Describe the life cycle of the rose starting with the seed by looking at pages 34 and 35 of "*Bud's World*". Move clockwise as you go through the cycle. Use these words:

rose hips
seeds
pollinate
honeybee
bud

petals
leaves
bloom
rose
planting

TEACHER MATERIALS

CONCEPTS:

Composition	-	to describe
Life Science	-	II A-1.2
		II A-1.1
Language	-	vocabulary
	-	spelling
	-	grammar skills

OBJECTIVE: The students will complete a creative writing exercise describing flowers, insects and their own experience.

ACTIVITIES:

1. Complete the science lesson on the flower.
2. Discuss, with the class, what you see looking at pages 18 and 19 in *Bud's World.*
3. Ask students to relate their own experiences concerning flowers, bees, or butterflies.
4. Have the students write sentences describing what they see.
5. As a class, compile the sentences into a paragraph or composition.
6. Make sure information is included about colors, scents, sounds, and feelings.
7. Make a bulletin board of the writing and have students illustrate it.
8. Submit writing to school newspaper or develop a school newspaper.
9. Select the top writing and submit it to the school district's newsletter.

TEACHER MATERIALS

CONCEPTS:

Reading	-	comprehension
	-	vocabulary
Life Science	-	II B-3 Animals depend on other animals
	-	II B-1 Animals depend on plants
Social Studies	-	citizenship
		change

OBJECTIVES:

1. At the end of the unit, the student will have read the story, comprehended its information, and increased his or her vocabulary.

2. At the end of the unit, the student will appreciate the animal/animal dependence of horse and human in the story.

BACKGROUND: Horses have been useful to mankind throughout history. Today is no exception. The use of horses is somewhat different today. Many children may have seen mounted police. This story is fictional. The child, Jose´, learns about horses through his friendship with a policeman and his horse.

ACTIVITIES:

1. Have the students read the story "The Mounted Police." Difficult words are highlighted on the vocabulary sheet.

2. Have the students complete the crossword puzzle "Horse Sense."

3. Have a class discussion as to why policemen still ride horses in cities.

   a. Large horses are good in crowd control. People will move rather than allow the horse to step on them.

   b. Being above the crowd allows the policeman to see what is happening, identify problem pockets or go to the heart of any problem.

   c. Horses can run faster than people so those fleeing the police can be chased.

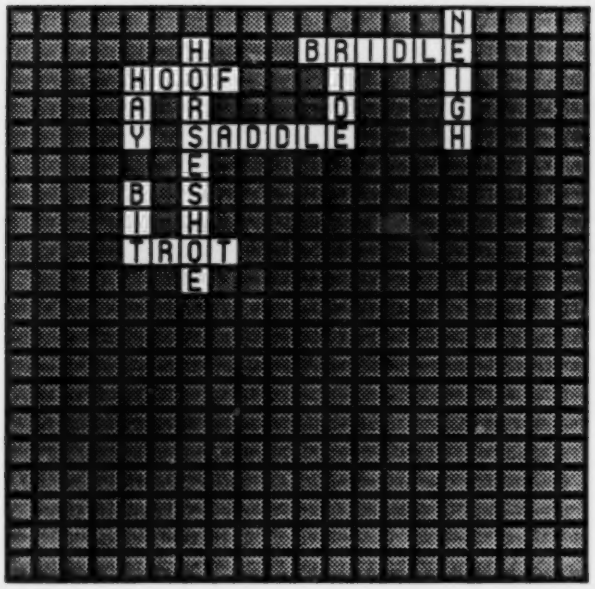
   d. A policeman on a horse is less intimidating to many people than those in squad cars.

   e. Children, and others, like horses. It helps make the policeman a part of the community which he or she serves.

   f. People might hesitate to throw a rock, bottle, or brick at a horse. Most people would not willingly hurt an animal.

4. This might be a good time to tie in citizenship, obeying laws, role of the police, etc.

Answers: HORSE SENSE



VOCABULARY

Thoroughbred-_____

_____

Territory- _____

_____

Stable- _____

_____

Legume- _____

_____

Hoof- _____

_____

Blacksmith-_____

_____

Bridle- _____

_____

Bit- _____

_____

Neigh- _____

_____

Whinny- _____

_____

The Mounted Police

Jose´ loved to watch the policeman ride down his street on a big brown horse. Every day he would think: "When I get bigger, I'm going to talk to him."

So, Jose´ waited and watched. He was only six and a half.

The day after Jose´ turned seven he decided, today is the day! All day long he waited for the policeman. He watched from his window.

3-26

Finally, he spotted the horse way down the street.

He raced down the stairs and out onto the sidewalk. He was just in time!

The policeman saw Jose´ and smiled. Jose´ was out of breath. He walked over near the horse.

Looking up at the mounted policeman from the curb, Jose´ said, "Hi! My name is Jose´!"

The policeman kept smiling and said, "I'm Officer Murphy, it's nice to meet you!"

"What is your horse's name?" asked Jose´.

Officer Murphy answered, "Her name is Rosie."

"Rosie?" Jose´ was surprised!

"Rosie is short for Rosalita Windfire Meadowdale," answered Officer Murphy. "Rosie is a registered thoroughbred."

"What is a th - thor, whatever it is?" asked Jose´.

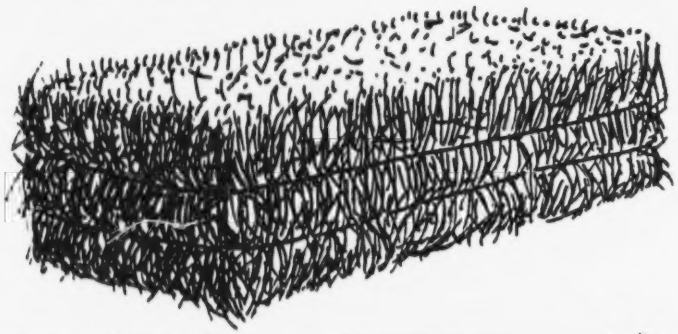
Officer Murphy laughed, "A thoroughbred is a breed of horse. Thoroughbreds are often race horses or jumpers. Well, I'd better move along. We have a lot of territory to cover."

"I'll see you tomorrow!" yelled Jose´ as he ran back into his building. He was thrilled to have talked to Officer Murphy and learned about Rosie.

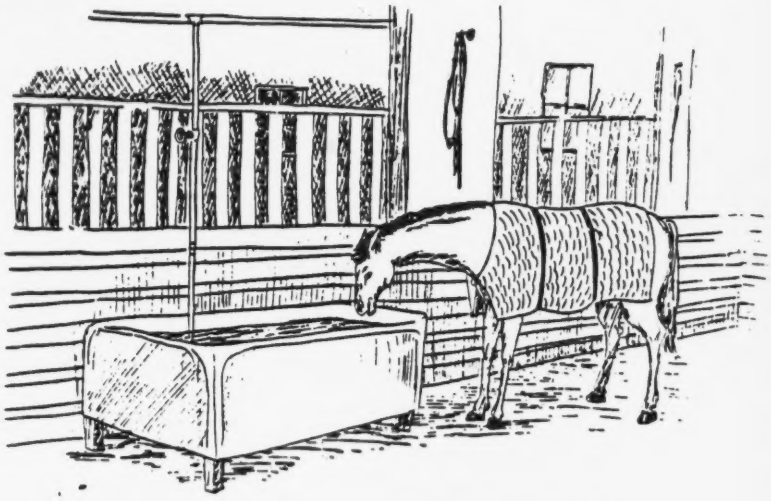
Every day Jose´ met Rosie and Officer Murphy. He learned a great deal about horses by talking to this policeman. First, Jose´ learned about Rosie's home.

Rosie's Home

Rosie lives in a special stable in the police station. A stable is the name for a horse's barn. She is fed oats, some other grain and hay. Hay is dried grass and legumes. A legume is a plant like clover.



Rosie also gets plenty of water. But Officer Murphy makes sure that he doesn't give water to Rosie when she is too hot. Sometimes a hot horse will drink too much cold water and get very sick. So Officer Murphy gives Rosie just a little water if she is hot.

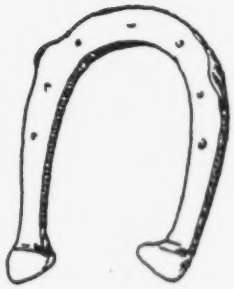


"What is all this stuff Rosie wears?" Jose´ asked another day.

Rosie's Clothes

Rosie doesn't really wear clothes like people do. Jose´ learned that a horse's foot is called a "hoof." The outside of the hoof is very much like Jose's fingernails. The horse's hoof is much thicker and harder though.

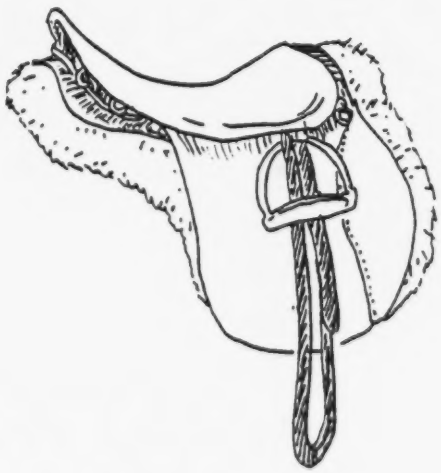
On the bottom of each hoof, Rosie had a metal shoe.



"Trotting on these streets is very tough on Rosie's feet (a trot is just faster than a walk). So, she has to wear metal shoes. Every two months we take the shoes off and trim her feet. Then the blacksmith puts the shoes back on," Officer Murphy told Jose´. "It doesn't hurt. In fact, it helps her."

Jose´ also learned about all of the leather Rosie wore. First, there was the bridle. The bridle goes over Rosie's head. Part of the bridle, called a "bit", goes into Rosie's mouth. The bit slides into a space in between Rosie's teeth. It is the bit which gives Officer Murphy control over Rosie.

Rosie's last "clothing" is a saddle. Officer Murphy puts the saddle on Rosie to make it easier to ride her. The type of saddle he uses is an English saddle.



Rosie's Training

Officer Murphy told Jose´, "I had to attend a special school to learn how to take care of Rosie and use her as a police mount. She had special training too."

"What was that?" questioned Jose´.

"Well, she had to be taught to remain calm in crowds. She had to learn to walk sideways. We use horses that way to move people in crowds without hurting them. But most of all, she had to learn not to be frightened by loud noises or excited people," said Officer Murphy, "and not to neigh or whinny and scare people."

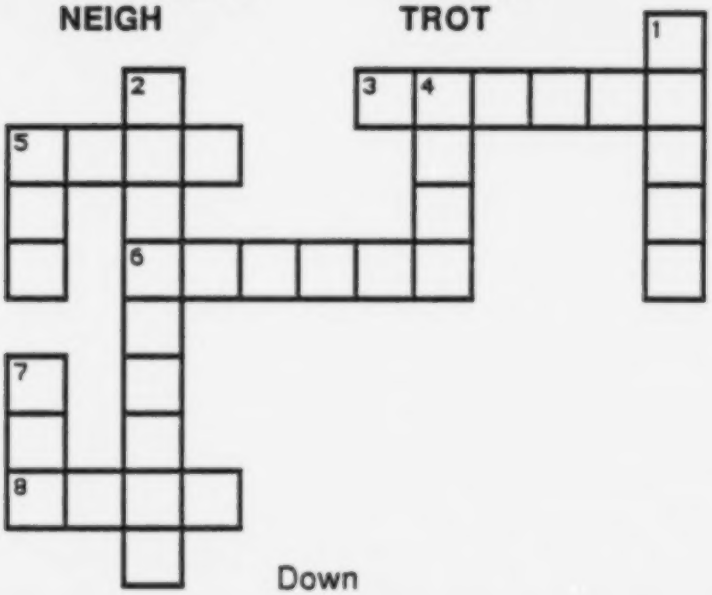
Over the next year, Jose´ became very good friends with Officer Murphy and Rosie. Today as he waves goodbye to them he thinks, "Maybe when I'm nine I'll be big enough to learn to ride!"

Name_____ Date_____

HORSE SENSE

Use these words to complete the crossword puzzle.

BIT	**HOOF**	**RIDE**
BRIDLE	**HORSESHOE**	**SADDLE**
HAY	**NEIGH**	**TROT**



Across

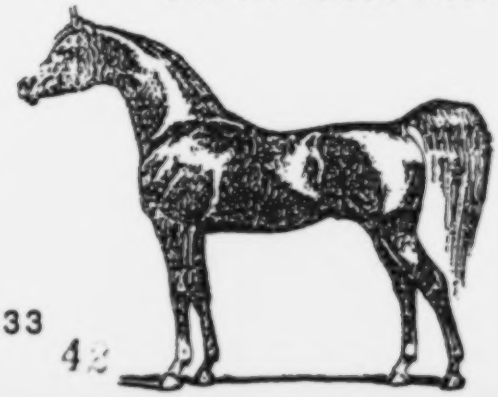
3. this equipment

5. a horse's foot
6. this equipment

8. faster than a walk

Down

1. another name for whinny
2.
4. Take a ____ on a horse.
5. Horses eat _____.
7. the part of the bridle that is in the horse's mouth



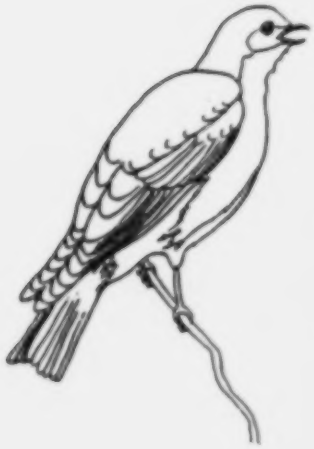
TEACHER MATERIALS

CONCEPTS: Mathematics
- games, integration, patterns
- addition
- subtraction
- multiplication
- division
- addition of decimals
- subtraction of decimals
- place value

Reading - work study skills
Life Science - I B-3

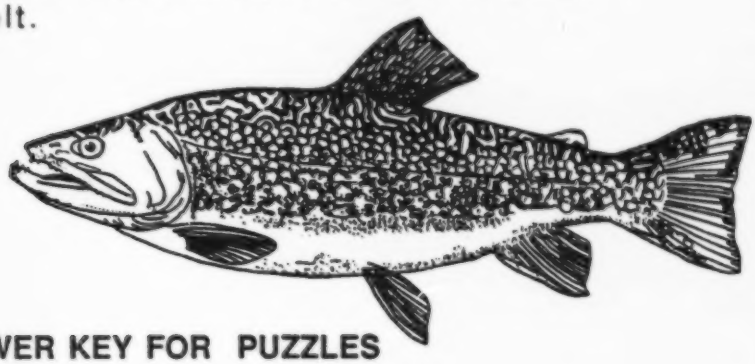
OBJECTIVE: The student will complete the assigned calculations and obtain answers to the word puzzles using their correct answers.

ACTIVITIES:
1. Have the students complete the assigned calculations.
2. Using the correct answers from their calculations, have them find the appropriate letters which correspond to their answers and fill in the blanks.
3. Give the students the attached picture to color once they solve the puzzle.
4. Display their work with the colored pictures.
5. A discussion of state symbols could be included or a coloring contest between class members.
6. Have the class make the apple muffins.



7. Have the students make a ladybug out of red construction paper with black pipe cleaners for legs.

8. Ask the art teacher to teach the class how to draw a rose, or make a rose from felt.



ANSWER KEY FOR PUZZLES

#1 Addition Puzzle

1. 600 = B
2. 741 = L
3. 770 = U
4. 609 = E
5. 600 = B
6. 675 = I
7. 766 = R
8. 604 = D

#2 Addition Puzzle

1. 242 = A
2. 800 = P
3. 800 = P
4. 600 = L
5. 363 = E

#3 Subtraction Puzzle

1. 380 = M
2. 100 = A
3. 385 = P
4. 280 = L
5. 120 = E

#4 Subtraction Puzzle

1. 387 = L
2. 48 = A
3. 193 = D
4. 675 = Y
5. 167 = B
6. 446 = U
7. 261 = G

#5 Multiplication Puzzle

1. 2 = B
2. 30 = R
3. 24 = O
4. 24 = O
5. 16 = K
6. 35 = T
7. 30 = R
8. 24 = O
9. 36 = U
10. 35 = T

#6 Division Puzzle

1. 5 = B
2. 6 = E
3. 4 = A
4. 8 = V
5. 6 = E
6. 7 = R

#7 Addition of Decimals Puzzle

1. 566.8 = M
2. 460.9 = I
3. 533.2 = L
4. 500.0 = K

 # 8 Subtraction of Decimals Puzzle

1. 4.6 = R
2. 2.3 = O
3. 5.1 = S
4. 0.9 = E

ANSWER KEY FOR CARMEN'S HORSE

1. 35 lbs.
2. 20 days
3. 98 lbs.
4. 3 bales
5. 22 lbs.

Addition Puzzle

Name_____ Date_____

Step 1. Find the sum of these numbers by adding:

1. 373
   +227

2. 275
   +466

3. 643
   +127

4. 417
   +192

5. 524
   + 76

6. 307
   +368

7. 288
   +478

8. 257
   +347

Step 2. Find the correct letter for the numbered blank in the chart. For example:

If there was a problem #10 and answer was 781, then the letter for space 10 would be "W".

Puzzle:

Our state bird is the

___	___	___	___	___	___	___	___
1	2	3	4	5	6	7	8

A = 510	J = 680	S = 768
B = 600	K = 690	T = 769
C = 603	L = 741	U = 770
D = 604	M = 756	V = 777
E = 609	N = 760	W = 781
F = 610	O = 761	X = 790
G = 656	P = 762	Y = 802
H = 665	Q = 764	Z = 810
I = 675	R = 766	

Step 3. If you have an answer, show it to your teacher.

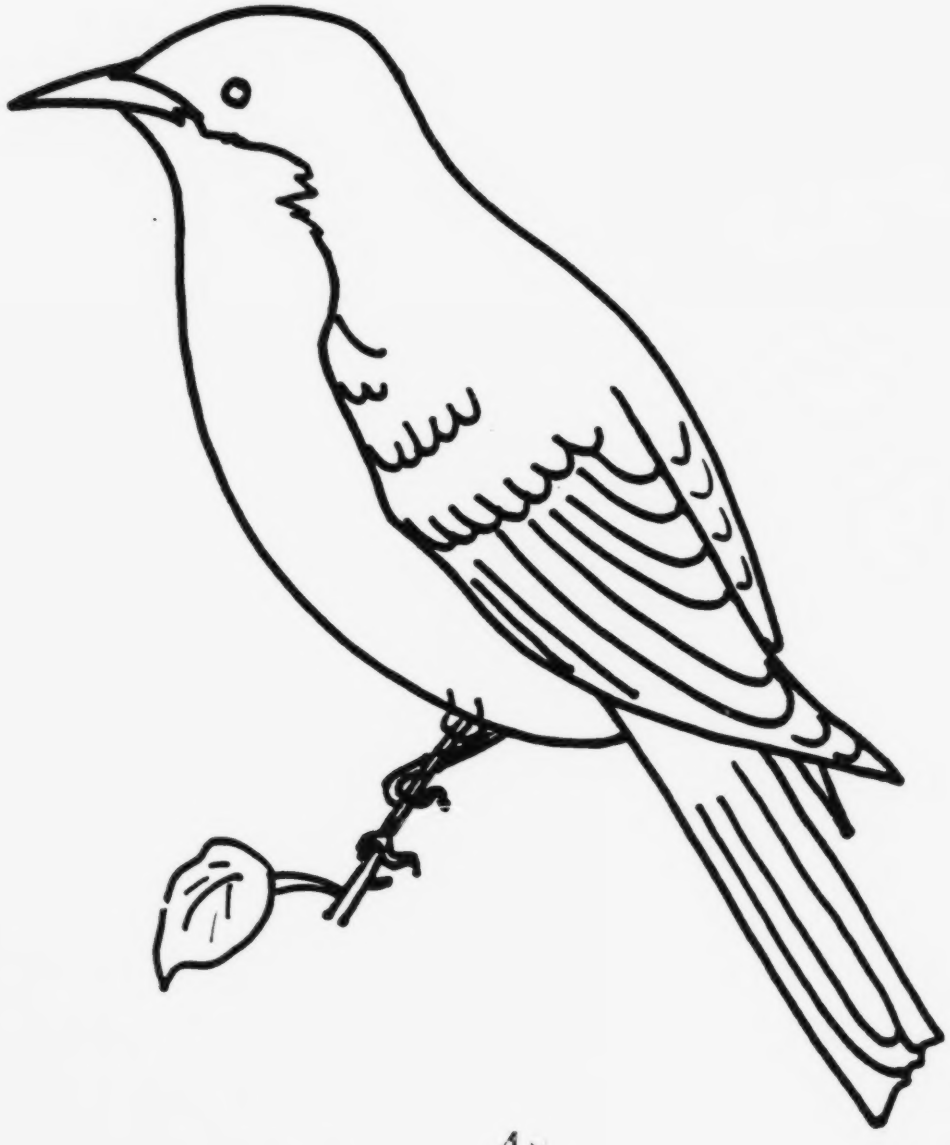
If the word you made does not make sense, you have made a mistake.

Go back and check your addition.

Name_____Date_____

THE NEW YORK STATE BIRD IS THE BLUEBIRD

(Color the Bluebird blue with an orange breast.)



Name_____Date_____

Step 1. Find the sum of these numbers by adding:

1. 122
   +120

2. 780
   +20

3. 510
   +290

4. 480
   +120

5. 233
   +130

Step 2: Find the correct letter for the numbered blank in the chart. For example: If there was a problem number 6 and the answer was 1,000, the letter for space 6 would be a **Z.**

Puzzle:

The New York State muffin is the

_____	_____	_____	_____	_____	MUFFIN
1	2	3	4	5	

A = 242	J = 520	S = 880
B = 352	K = 580	T = 890
C = 360	L = 600	U = 920
D = 362	M = 650	V = 950
E = 363	N = 675	W = 980
F = 370	O = 690	X = 989
G = 400	P = 800	Y = 999
H = 420	Q = 840	Z = 1,000
I = 457	R = 850	

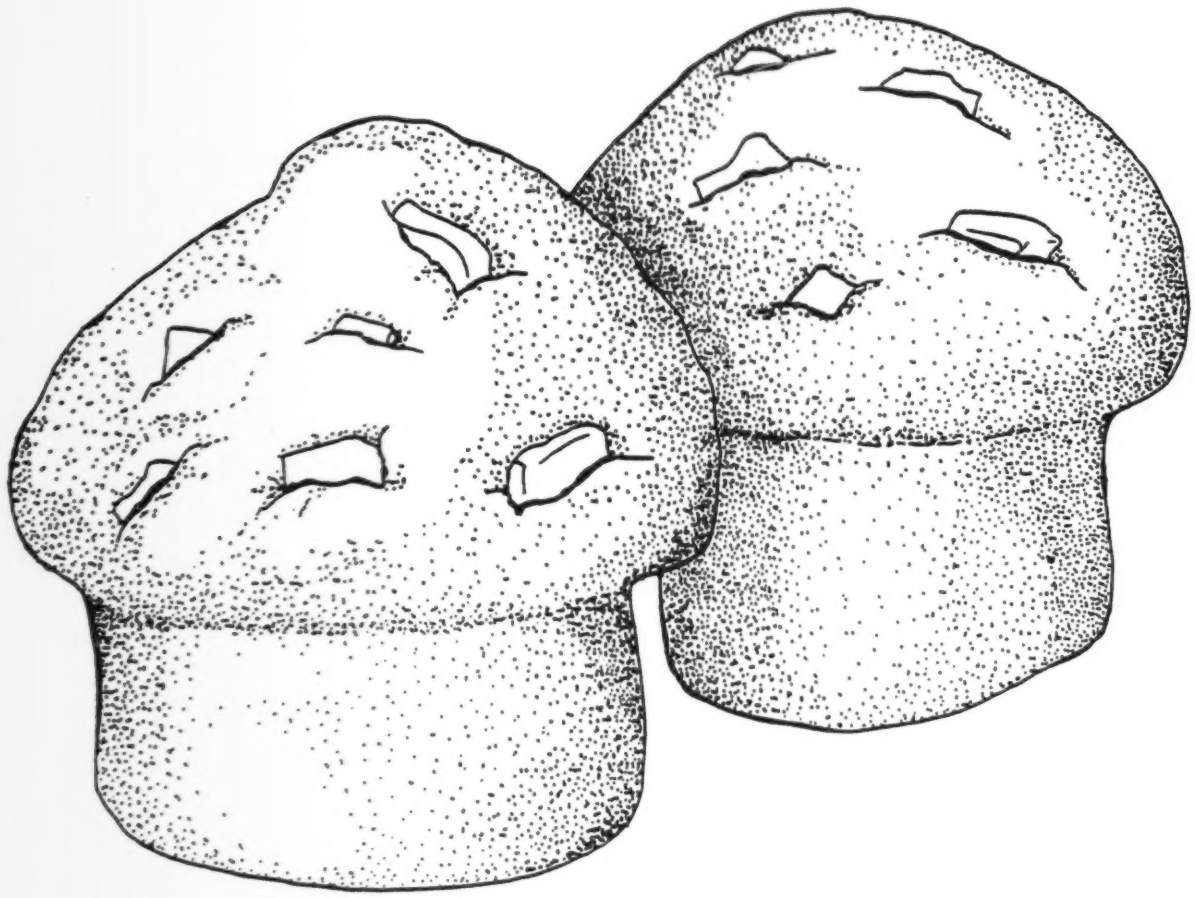
Step 3: If you have an answer, show it to your teacher.

If the word you made does not make sense, you have made a mistake.

Go back and check your subtraction.

Name_____ Date _____

THE NEW YORK STATE MUFFIN IS THE APPLE MUFFIN



Governor Cuomo Made it Official on August 10, 1987

The New York State Muffin Is the APPLE MUFFIN

Thanks to an enterprising group of fourth graders from the North Syracuse Central School District, New York has a State Muffin. The "Apple Muffin Gang" (as this group is now called) chose a product that salutes two of New York State's largest agricultural industries -- the apple and the food processing industry. The following recipe for the delicious apple muffin includes many quality New York state ingredients.

Muffins

2	cups flour
3/4	cup brown sugar
1/2	cup sugar
2	teaspoons baking soda
1/2	teaspoon salt
1-1/2	teaspoon cinnamon
1/2	teaspoon cloves
1/8	teaspoon nutmeg
2	cups apples, coarsely chopped (Cortland, McIntosh, Pippin)
1/2	cup raisins
1/2	cup walnuts
3	eggs
4 oz.	cream cheese, cut into small pieces
1/2	cup butter, melted
1/2	teaspoon vanilla

Topping

1/2	cup walnuts
1/2	cup brown sugar
1/4	cup flour
1	teaspoon cinnamon
1	teaspoon lemon peel, grated
2	Tablespoons butter, melted

Preheat oven to 375 degrees F. Combine flour, salt, spices, baking soda; set aside. Combine apples, raisins, walnuts, eggs, cream cheese, butter and vanilla. Add dry ingredients, a little at a time, to the apple mixture. Portion batter into muffin papers. Combine all topping ingredients. Sprinkle on batter. Bake for 20 to 30 minutes. Makes 24 muffins.

CONGRATULATIONS TO THE APPLE MUFFIN GANG!

Name_____ Date_____

Step 1: Find the difference between these numbers:

1. 400
   - 20

2. 600
   -500

3. 437
   - 52

4. 700
   -420

5. 360
   -240

Step 2: Find the correct letter for the numbered blank in the chart. For example: If there was a problem number 6 and the answer was 400, the letter for space 6 would be **Q**.

Puzzle:

The New York State tree is the

_____	_____	_____	_____	_____	**TREE**
1	2	3	4	5	

A = 100	J = 200	S = 450
B = 110	K = 250	T = 458
C = 112	L = 280	U = 488
D = 113	M = 380	V = 490
E = 120	N = 381	W = 500
F = 127	O = 383	X = 527
G = 128	P = 385	Y = 548
H = 190	Q = 400	Z = 550
I = 199	R = 420	

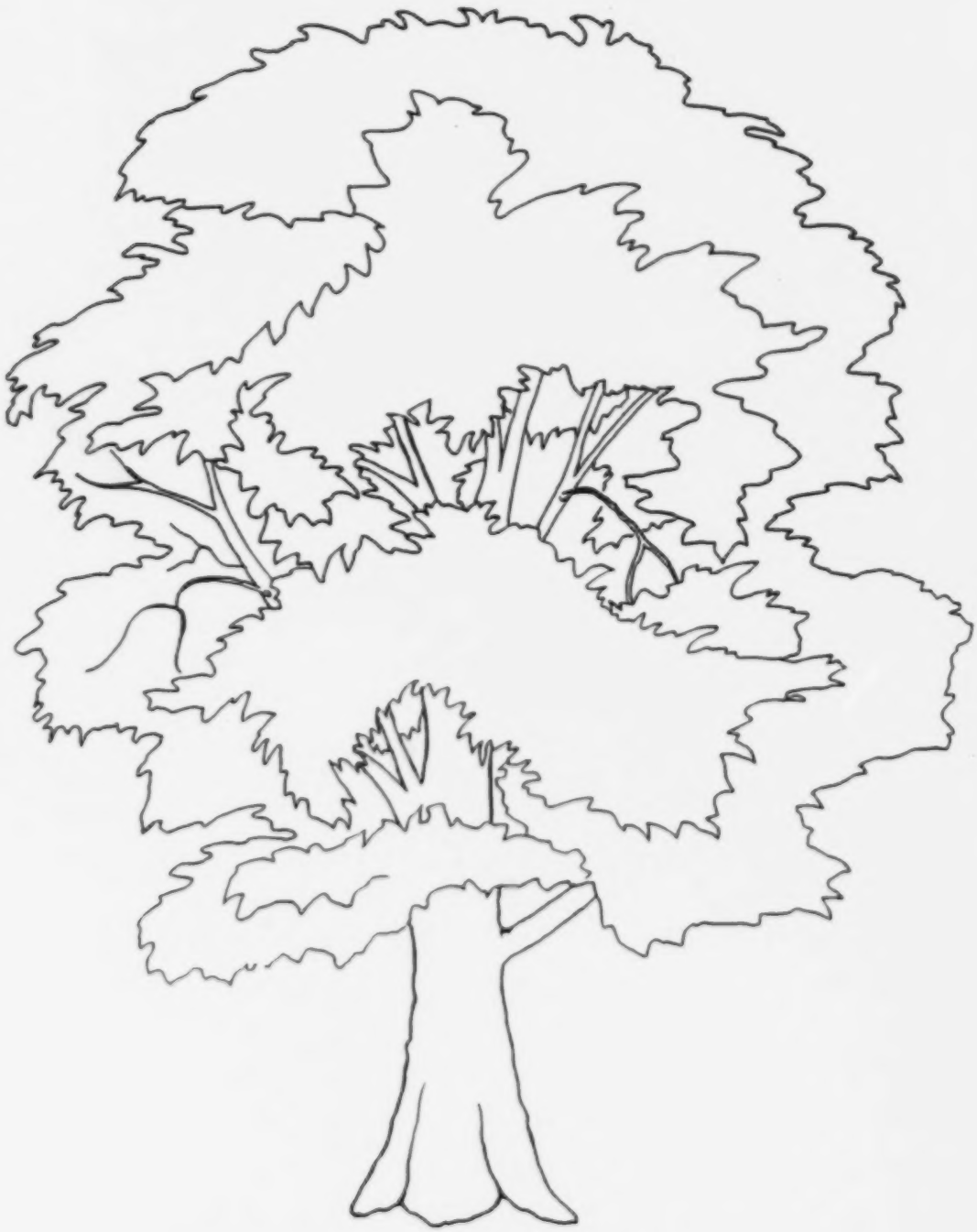
Step 3: If you have an answer, show it to your teacher.

If the word you made does not make sense, you have made a mistake.

Go back and check your subtraction.

Name_____ Date_____

THE NEW YORK STATE TREE IS THE MAPLE TREE



Subtraction Puzzles

Name_____Date_____

Step 1. Find the difference between these by subtracting:

1. 873
   - 486

2. 733
   - 685

3. 427
   - 234

4. 941
   - 266

5. 696
   - 529

6. 555
   - 109

7. 400
   - 139

Step 2. Find the correct letter for the numbered blank in the chart. For example:

If there was a problem number 10 and the answer was 555, then the letter for space 10 would be W.

Puzzle:

Our state insect is the

1	2	3	4	5	6	7

A = 48	J = 356	S = 427
B = 167	K = 371	T = 436
C = 183	L = 387	U = 446
D = 193	M = 388	V = 456
E = 203	N = 389	W = 555
F = 251	O = 390	X = 665
G = 261	P = 395	Y = 675
H = 320	Q = 397	Z = 685
I = 346	R = 407	

Step 3. If you have an answer, show it to your teacher.

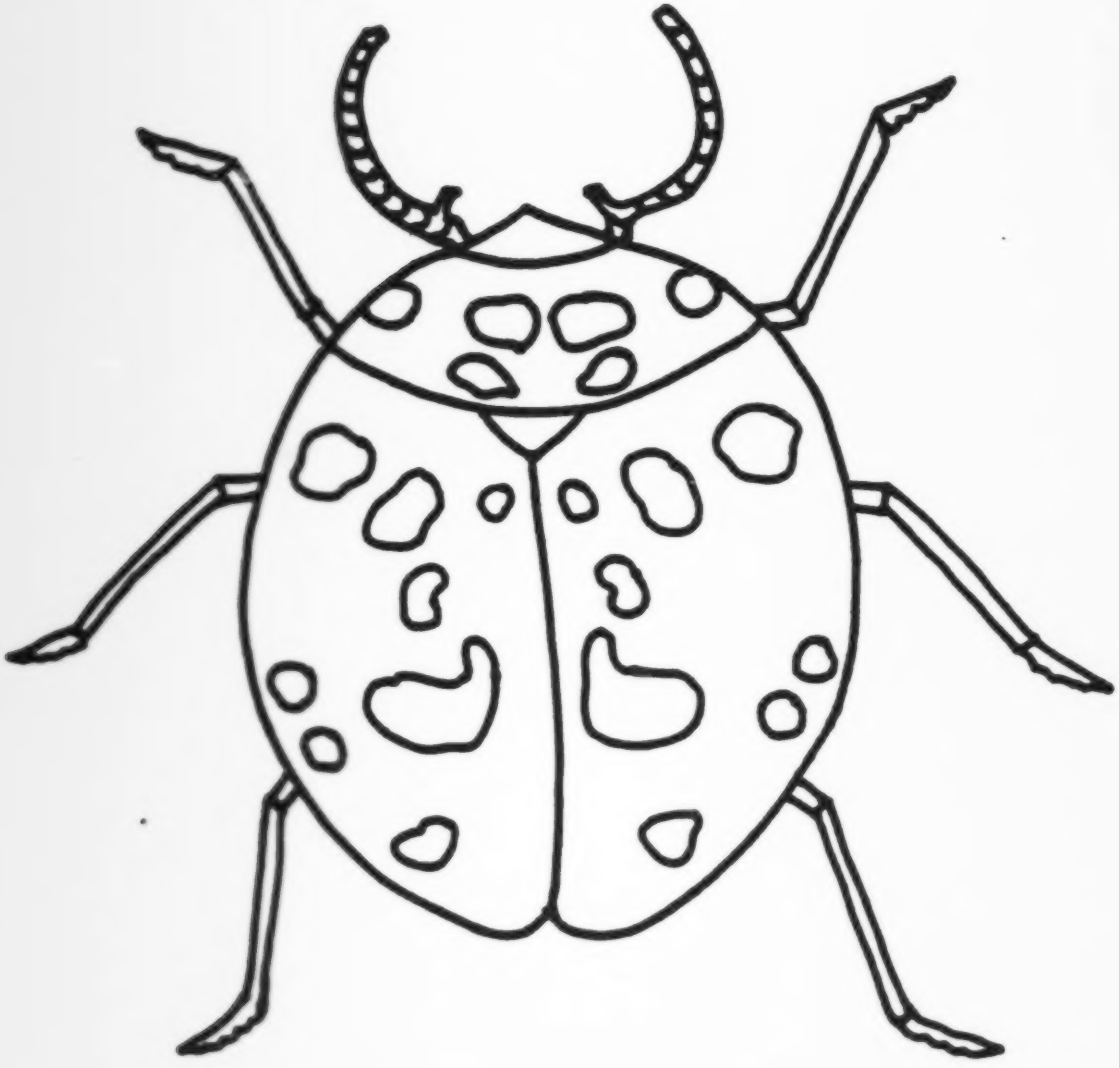
If the word you made does not make sense, you have a mistake.

Go back and check your subtraction.

Name_____Date_____

THE NEW YORK STATE INSECT IS THE LADYBUG

(Color the ladybug red with black spots.)



Multiplication Puzzles

Name_____Date_____

Step 1. Multiply these numbers together:

1. 2 x 1

2. 6 x 5

3. 8 x 3

4. 6 x 4

5. 2 x 8

6. 7 x 5

7. 5 x 6

8. 3 x 8

9. 4 x 9

10. 5 x 7

Step 2. Find the correct letter for the numbered blank in the chart. For example:

If there was a problem number 11 and the answer was 1, then the letter for space 11 would be A.

Puzzle:

Our state fish is the

___	___	___	___	___	___	___	___	___	___
1	2	3	4	5	6	7	8	9	10

A =1	J = 15	S = 32
B = 2	K = 16	T = 35
C = 5	L = 18	U = 36
D = 6	M = 19	V = 40
E = 7	N = 20	W = 42
F = 8	O = 24	X = 45
G = 10	P = 26	Y = 48
H = 12	Q = 28	Z = 49
I = 14	R = 30	

Step 3. If you have an answer, show it to your teacher.

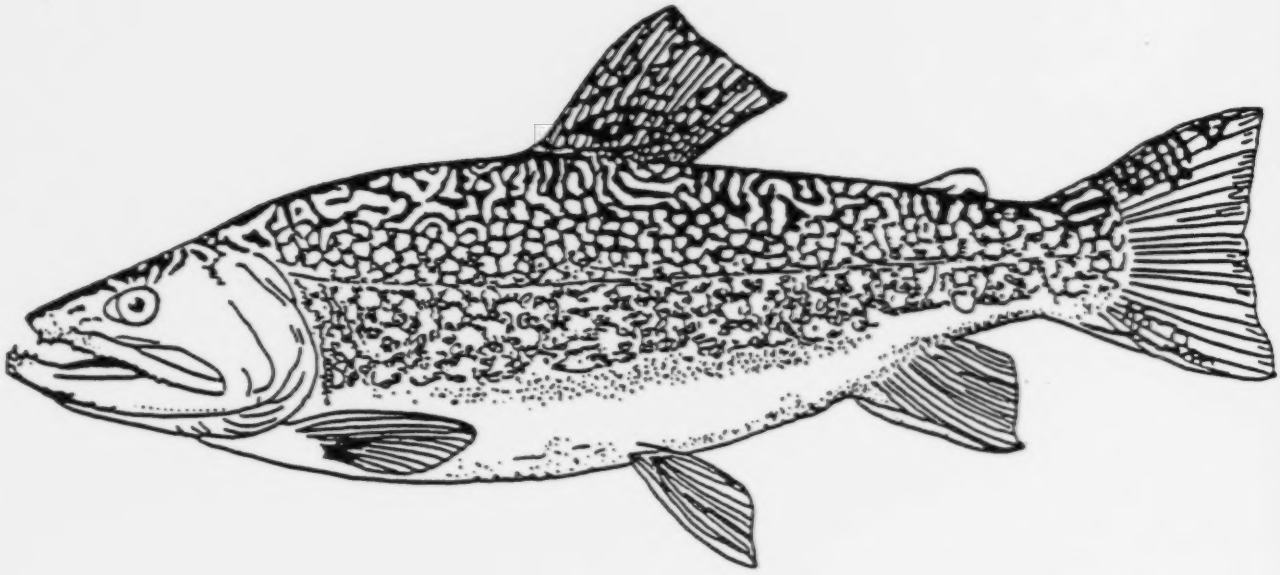
If the word you made does not make sense, you have made a mistake.

Go back and check your multiplication.

Name_____Date_____

THE NEW YORK STATE FISH IS THE BROOK TROUT

(Color the Brook Trout greenish brown with red spots outlined in blue and reddish lower fins)



Division Puzzles

Name_____Date_____

Step 1. Divide these numbers:

1. 20 ÷ 4 =

2. 42 ÷ 7 =

3. 16 ÷ 4 =

4. 56 ÷ 7 =

5. 36 ÷ 6 =

6. 21 ÷ 3 =

Step 2. Find the correct letter for the numbered blank in the chart. For example:

If there was a problem number 7 and the answer was 15, then the letter for space seven would be Z.

Puzzle:

Our state mammal is the

1	2	3	4	5	6

A = 4	J = 17	S = 12
B = 5	K = 20	T = 18
C = 10	L = 26	U = 25
D = 9	M = 13	V = 8
E = 6	N = 23	W = 2
F = 3	O = 19	X = 21
G = 0	P = 16	Y = 24
H = 14	Q = 1	Z = 15
I = 22	R = 7	

Step 3. If you have an answer, show it to your teacher.

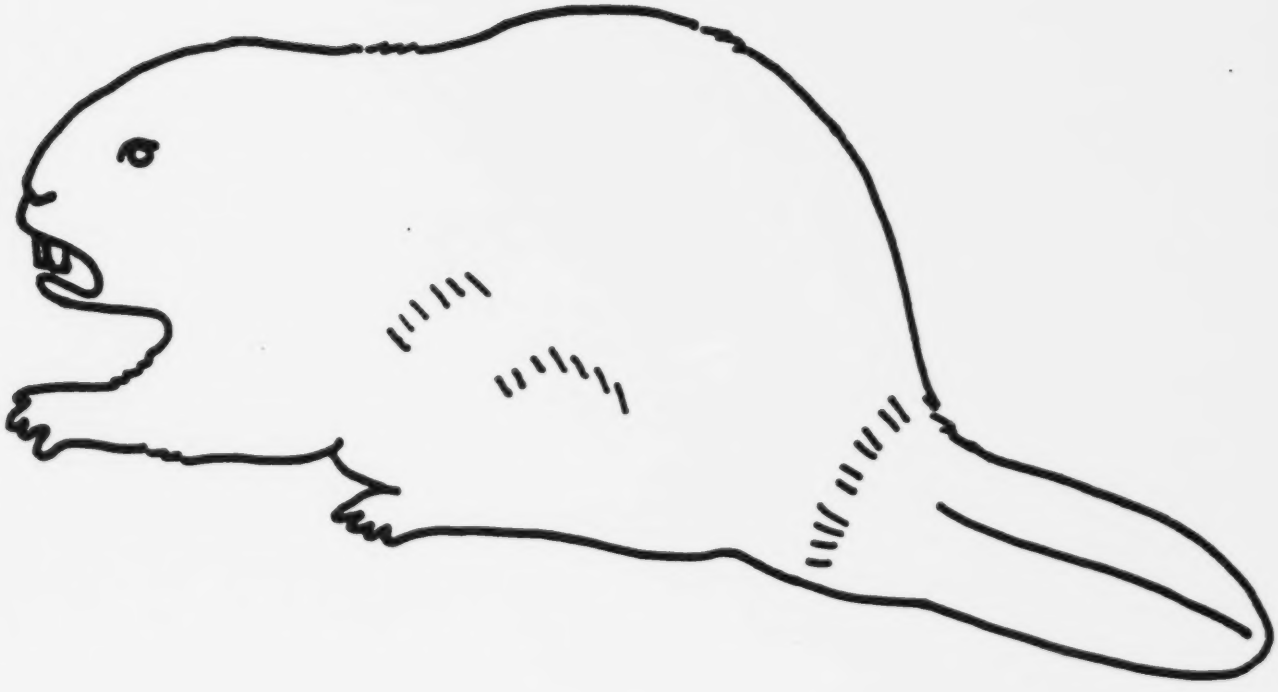
If the word you made does not make sense, you have made a mistake.

Go back and check your division.

Name_____ Date_____

THE NEW YORK STATE MAMMAL IS THE BEAVER

(Color this beaver brown with a darker tail)



Addition of decimals

Name_____Date_____

Step 1. Add these numbers together:

1. 268.9
+ 297.9

2. 123.4
+ 337.5

3. 366.6
+ 166.6

4. 362.8
+ 137.2

Step 2. Find the correct letter for the numbered blank in the chart. For example:

If there was a problem number 10 and the answer was 400.0 then the letter for space 10 would be A.

Puzzle:

Our state beverage is

1	2	3	4
_____	_____	_____	_____

A = 400.0	H = 457.1
B = 437.6	I = 460.9
C = 441.7	J = 490.0
D = 450.9	K = 500.0
E = 451.7	L = 533.2
F = 452.5	M = 566.8
G = 455.5	N = 576.8

Step 3. If you have an answer, show it to your teacher.

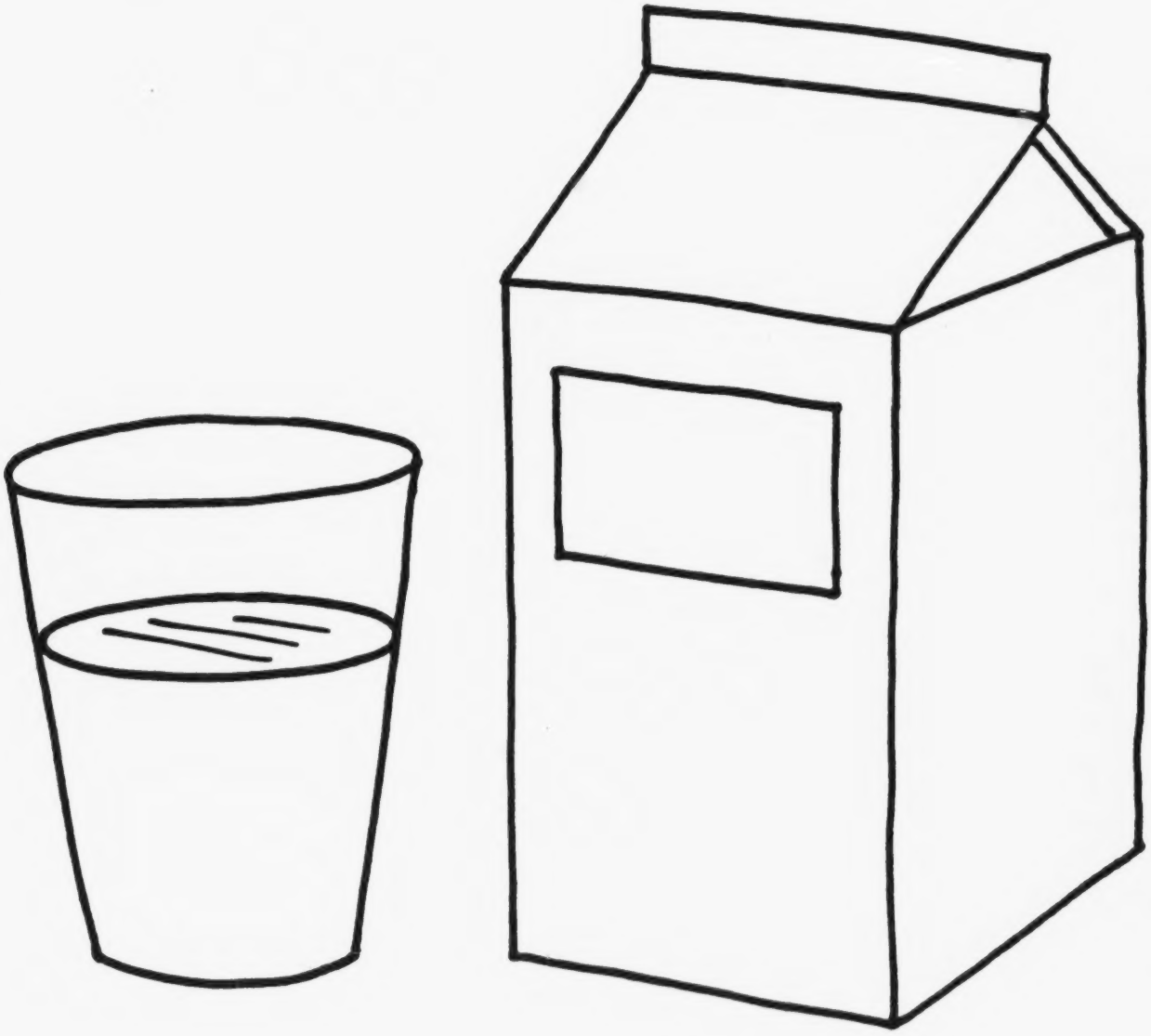
If the word you made does not make sense, you have made a mistake.

Go back and check your addition.

Name _____ Date_____

THE NEW YORK STATE BEVERAGE IS MILK

(Color this milk and carton the colors of your favorite brand and flavor.)



Subtraction of decimals Puzzle

Name_____Date_____

Step 1. Subtract these numbers:

1. $\begin{array}{r} 7.3 \\ -\ 2.7 \\ \hline \end{array}$

2. $\begin{array}{r} 6.1 \\ -\ 3.8 \\ \hline \end{array}$

3. $\begin{array}{r} 14.4 \\ -\ 9.3 \\ \hline \end{array}$

4. $\begin{array}{r} 11.8 \\ -10.9 \\ \hline \end{array}$

Step 2: Find the correct letter for the numbered blank in the chart. For example: If there was a problem number 10 and the answer was 0.1 the letter for space 10 would be an A.

Puzzle:

The New York State flower is the

1	2	3	4

A = 0.1	J = I.5	S = 5.1
B = 0.3	K = 1.6	T = 5.4
C = 0.5	L = 1.8	U = 5.5
D = 0.7	M = 2.0	V = 5.9
E = 0.9	N = 2.1	W = 6.0
F = 1.1	O = 2.3	X = 6.2
G = 1.2	P = 2.7	Y = 6.7
H = 1.3	Q = 3.1	Z = 7.0
I = 1.4	R = 4.6	

Step 3: If you have an answer, show it to your teacher.

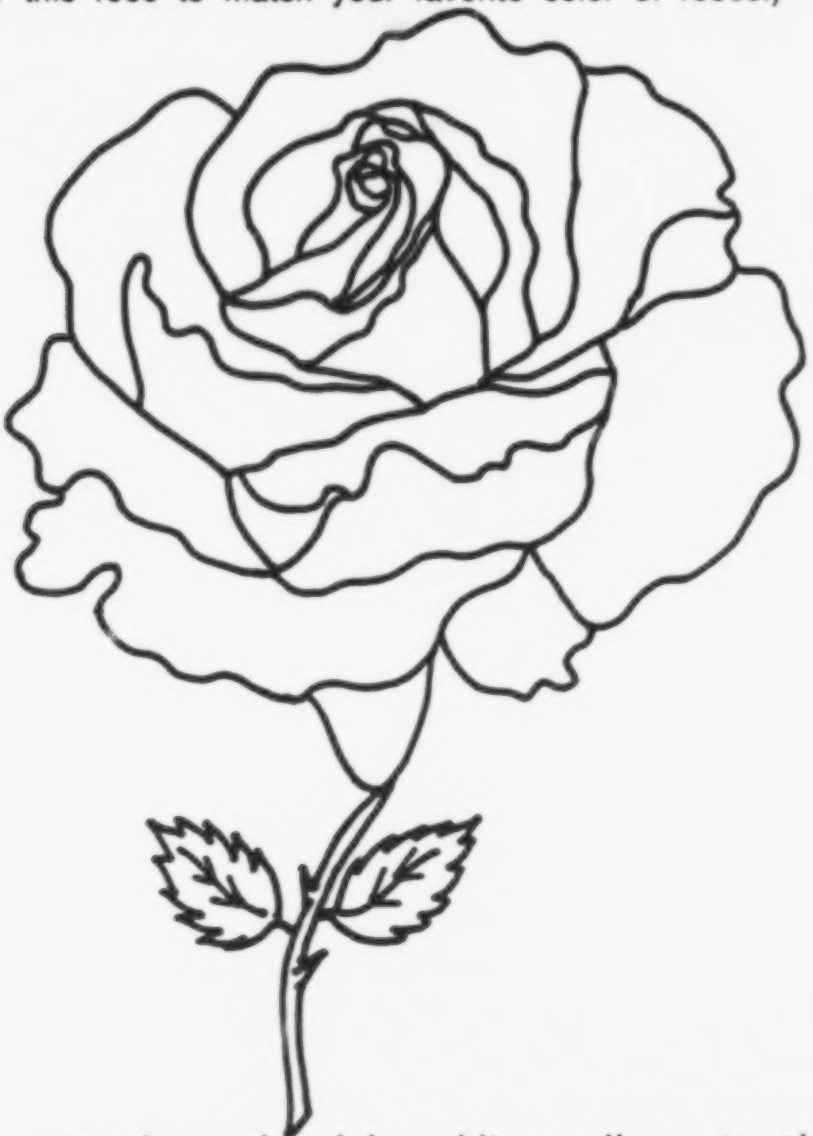
If the word you made does not make sense, you have made a mistake.

Go back and check your subtraction.

Name_____Date _____

THE NEW YORK STATE FLOWER IS THE ROSE

(Color this rose to match your favorite color of roses.)



Roses may be red, pink, white, yellow, peach, salmon, orange, maroon or violet.

Story Problems

TEACHER MATERIALS

CONCEPTS: Mathematics
- story problems
- multiplication
- division

Life Science - I B-3

OBJECTIVE: At the end of this unit the students will complete the story problems.

BACKGROUND: Animals which have been domesticated depend upon their human owners to properly care for them. Those who raise animals for a purpose (such as sport, milk, or meat production) are well aware of this. It is in their best interest to properly care for their animals. Animals which are under stress do not produce well. Stress to an animal could be crowded conditions, poor food, bad water, or cruel treatment.

Most students today come in contact with small animals only. The care and feeding of large animals is foreign territory. This exercise allows the student to perform story problems while learning some accurate facts about feeding a horse.

ACTIVITIES:

1. Have the students complete the worksheet.
2. Discuss humane treatment of animals. Have the students relate experiences with their own pets.
3. Complete the other lessons about horses.

Story problems
- **multiplication**
- **division**

Name_____ Date_____

1. Carmen wants to know how much grain the horse she rides will eat in a week. Can you help her? The horse eats 5 pounds of oats in one day. How many pounds of oats does it eat in one week?

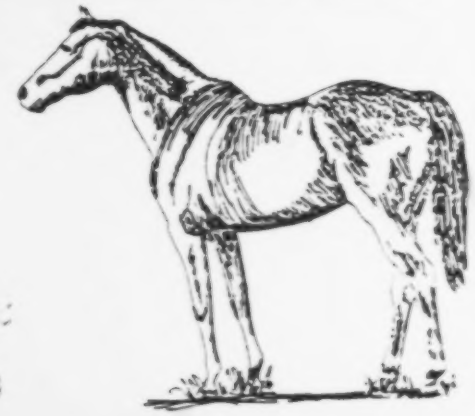
_____

2. Oats are sold in 100 pound bags. How many days will one bag last if the horse eats 5 pounds in one day?

_____

3. The horse Carmen rides eats 14 pounds of hay in one day. How many pounds of hay does this horse eat in one week?

_____

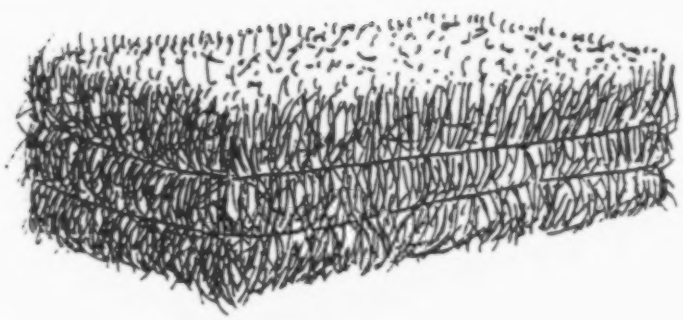


4. Hay comes in a package, tied with string. This is called a bale. Each bale weighs 40 pounds. Using the answer from number 3, how many bales of hay should Carmen buy to feed the horse for one week?

_____

5. How many pounds of hay will Carmen have left over in problem #4?

_____



TEACHER MATERIALS

CONCEPTS: Life Science - II A - 1.1 Life Cycle
- 1.2 Flower Structure

Language - vocabulary

OBJECTIVES:
1. Students will be able to label the structures of the flower.
2. Students will be able to describe the function or role of each flower structure.

BACKGROUND: The understanding of the flower is vital to agriculture. Most food and fiber crops produced by U. S. agriculture are seed crops. Wheat, corn, oats, and rice are all seeds produced from flowers. Fruits, such as watermelons, apples, pears, and tomatoes are structures housing seeds which are also produced from flowers. Broccoli, cauliflower and artichokes are the actual flower which we eat as a vegetable. Flowers also make possible honey and fragrances. But that is another lesson.

ACTIVITIES:
1. Have the students read pages 20-21 in *"Bud's World"*.
2. (a) Have the students label the parts on the diagram of the flower by referring to page 20 in *"Bud's World"*.

(b) Obtain and dissect real flowers. (Perhaps a local florist or funeral home would provide you with their discards.)

3. Discuss the parts of the flower - male and female. See attached information.

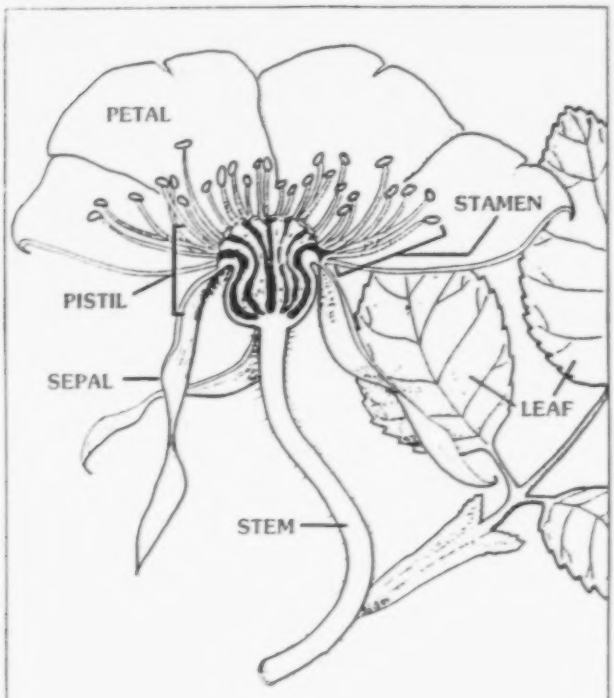
4. Explain where the flower fits into the life cycle of the plant. Ask the students to describe the life cycle diagram.

5. Complete the lesson in language arts about the life cycle of the rose.

6. Complete the next lessons.

7. After completing the next 2 lessons, show the filmstrip *"Insects: How They Help Us"* (see Resource Guide).

THE PARTS OF THE ROSE



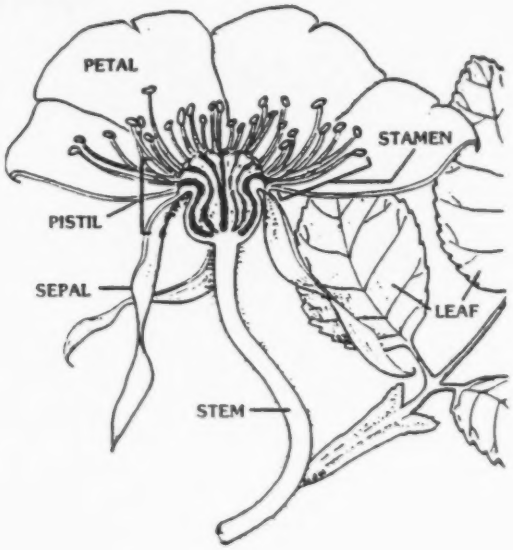
The male part of the flower is the stamen. The top of the stamen produces pollen. Pollen is the grainy dust in a flower.

The female part of the flower is the pistil. Inside of the pistil is the place seeds will develop.

Flower Structure - Information

A flower such as the one below and the one in *"Bud's World"* is called a perfect flower. It is considered perfect because it has both male and female organs within one flower structure. Flowers may also appear as imperfect or composite. An imperfect flower is either male or female. Plants with imperfect flowers are squash, corn, begonias, asparagus, spinach and willow. A composite flower contains many florets (small flowers) joined together. Some florets may be perfect, some containing only the pistils. Examples of composite flowers are zinnias, mums and marigolds. (If you are going to obtain flowers to dissect, it is crucial to know what to look for).

THE FLOWER



The Female Structure - The female portion of the flower is the pistil. The pistil can be divided into three major sections. The top of the pistil is the stigma. The stigma is sticky to catch and hold pollen grains. The tube-like structure supporting the stigma is the style. At the base of the style is a bulging structure known as the ovary. It is inside the ovary where the female germ cells are created in the ovules. The ovules develop into seeds if fertilized.

The Male Structure - The male structure is known as the stamen. It is comprised of an anther and a filament. The filament holds up the anther. The anther produces pollen grains (the male germ cells).

The Petals - The petals attract pollinators to the flower and protect the internal structures. You will note that plants which need assistance to pollinate have attractive flowers. Plants which are wind pollinated, for example, do not. A wind-pollinated plant is corn.

The Sepals - The small green leaves below the petals are sepals. The sepal supports the petals and protects the flower parts.

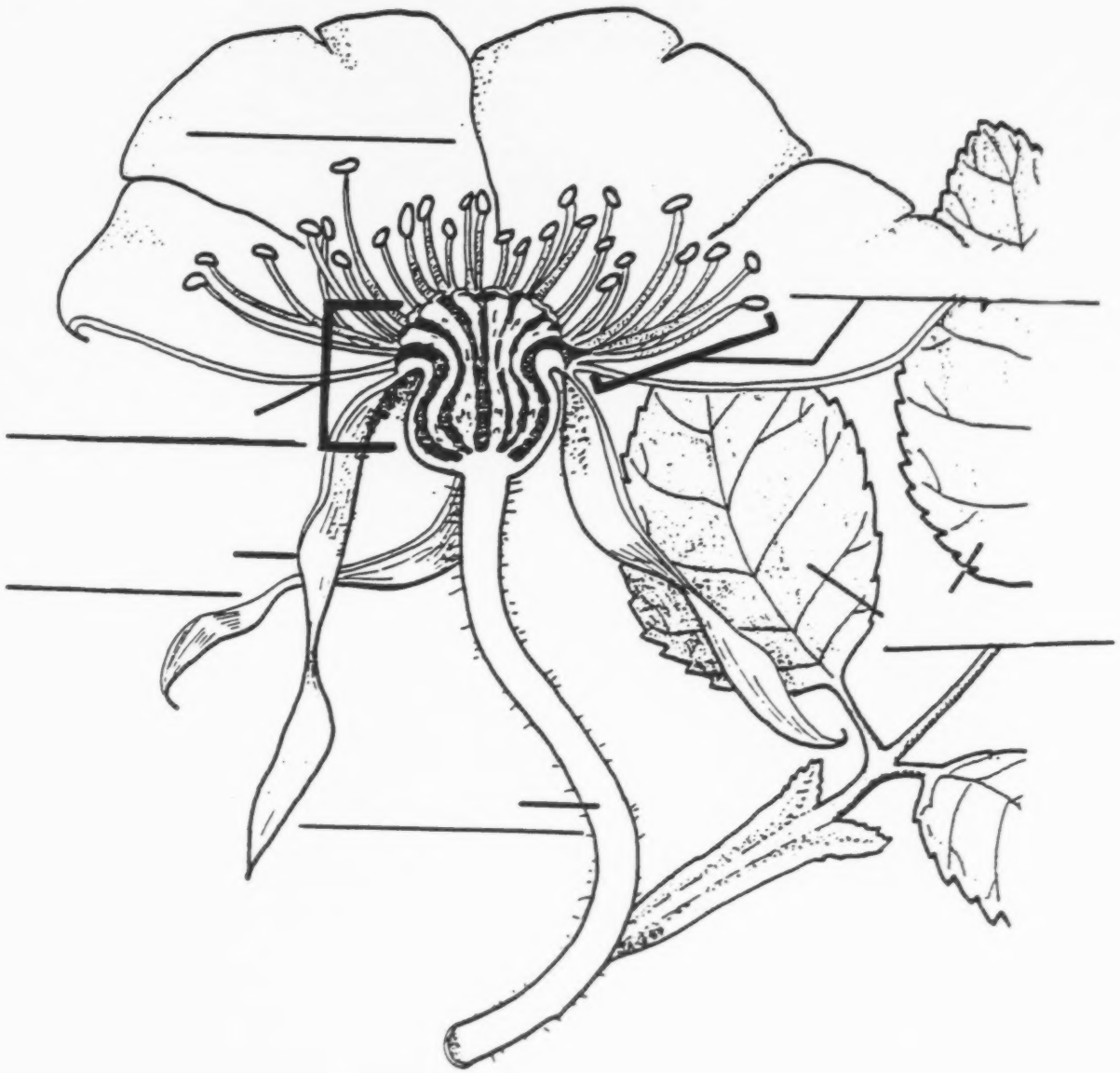
Name_____Date_____

Parts of the Rose

Worksheet

Label the diagram below using these words:

Pistil	Stamen	Petal
Stem	Leaves	Sepal

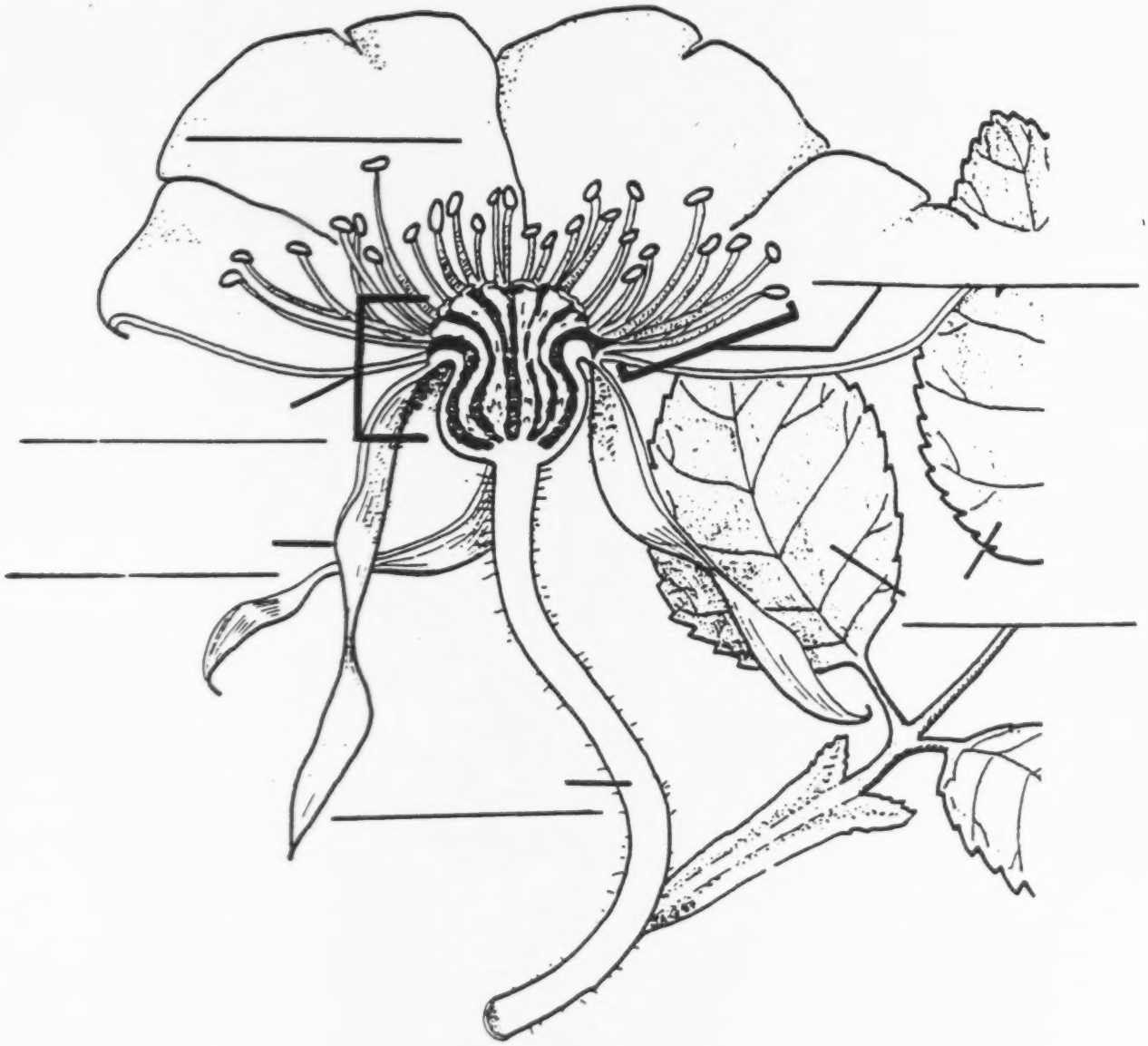


Name_____Date_____

Parts of the Flower
Quiz

Label the diagram below using these words:

Pistil	Stamen	Petal
Stem	Leaves	Sepal



Life Science -
II A - 1.21, 1.22
II B - 1.2

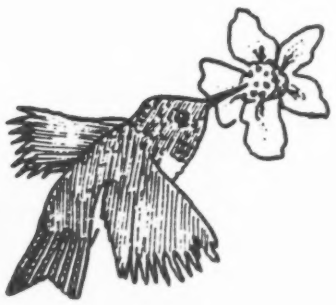
TEACHER MATERIALS

CONCEPTS: Life Science - II A - 1.21 - transfer of pollen
1.22 - pollination aided by bees
IIB - 1.2 - animal/plant dependencies

OBJECTIVES:
1. The student will be able to describe pollination.
2. The student will be able to explain the function of a pollinator such as a bumblebee.
3. The student will understand that plants may be as dependent upon animals as animals are on plants.

BACKGROUND: Pollination of flowers occurs in many ways - the wind, birds, insects, bats, and humans can be pollinators. Without adequate pollination, many crops would be reduced or non-existent. To ensure adequate pollination many steps are taken. Orchard owners may rent colonies of bees. In greenhouses, people are hired to hand-pollinate crops such as tomatoes.

ACTIVITIES:
1. Have the students read pages 20-21 in *"Bud's World"*.
2. Discuss pollination .
3. Offer options of other animal pollinators - birds, bats, butterflies, moths, insects, and small rodents.



4. Have the students label the pollinators on pages 22 and 23 in *"Bud's World"*.

5. Explain that some plants are pollinated by the wind -- wheat, oats and corn.

6. Read the book, *The Reason for a Flower*, by Ruth Heller.

7. Have the students do the "Be a Bee" activity. Materials needed:

   (1) One 4" x 4" square of black construction paper per student.

   (2) One 2 1/2" - 3" length of scotch tape per student.

   (3) Flowers such as dandelions or

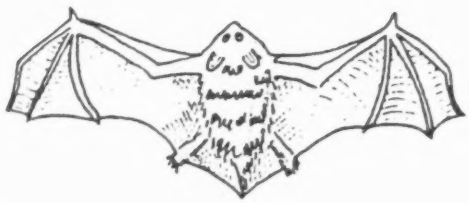
   (a) a 3" circle of white construction paper

   (b) baby powder, talc, corn starch

   (4) One black pipe cleaner per student

   (5) Another pipe cleaner or a 6" length of heavy wire to hold "the bee"

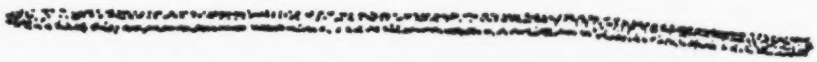
8. After completing the next lesson, show the filmstrip, "*Insects: How They Help Us*" (see Resource Guide).



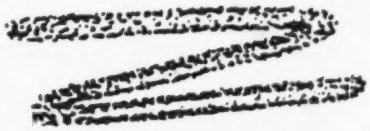
BE A BEE

How do bees, birds, bats, moths and ants pollinate flowers?

MAKE A BEE:

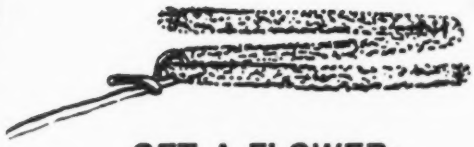


1. Take a pipe cleaner and fold it into thirds.



2. Loop a wire around one bend and twist it until it holds the pipe cleaner securely.

3. Flatten the pipe cleaner.

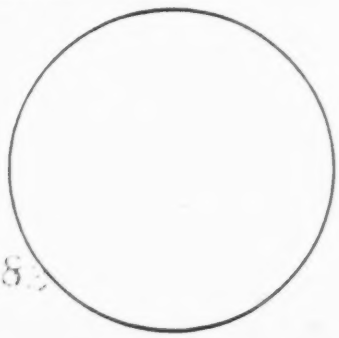


GET A FLOWER:

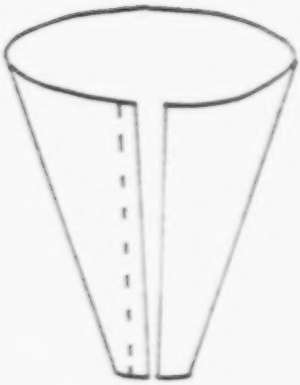
1. Pick wild flowers. Dandelions are a good choice.

2. If no flowers are available make one:

   a. Cut white construction paper into a 2 1/2-3 inch circle.



b. Cut a wedge out of it.



c. Make a cone. Tape it

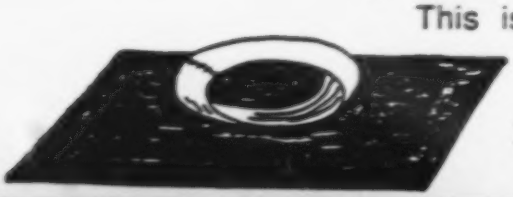
d. Fill the 'base' of the
pollen. About a 1/4 inc
powder should do.

MAKE A PISTIL:

a. Roll up a 3 inch length of s

b. Place it on a 4 inch b
black construction pa
of black corduroy or
place of the tape and
paper.)

c. Make sure that the t
This is your pistil.



of it.

ape it closed.

of the 'flower' with
a 1/4 inch of baby
d do.

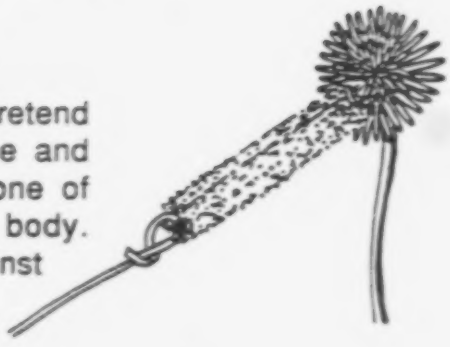
ength of scotch tape.

a 4 inch by 4 inch square of
truction paper. (Or a piece
orduroy or velvet will do in
e tape and construction

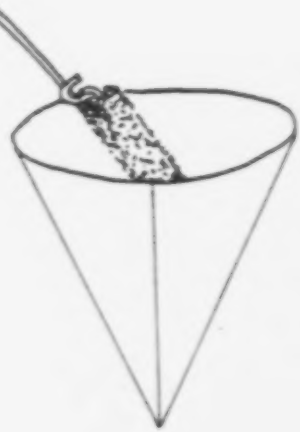
e that the tape is still sticky.
our pistil.

POLLINATE THE PISTIL

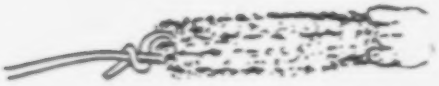
a. Have the students pretend that they are the bee and the pipe cleaner is one of their legs or their body. Brush the "BEE" against the flower.

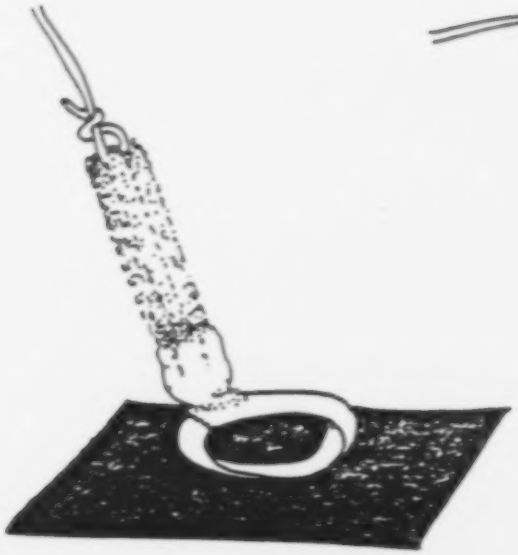


b. Then touch the pistil with the bee. Several brushings should prove how a bee, or another pollinator, works.



CAN YOU SEE THE 'POLLEN'?





TEACHER MATERIALS

CONCEPTS: Life Science - I B - 1, 2
- I A - 2.11, 2.12
  2.4, 2.5, 2.6, 2.7
- II A- 2.1, 2.2

Social Studies - interdependence
- culture
- identity
- empathy
- citizenship

OBJECTIVES: At the end of this unit the student will:

1. Realize the importance of bees to food production and the interdependence of plants and animals.

2a. Label each type of bee in a hive: queen, drone, worker.

2b. Describe the three different types of bees and their importance to the hive.

3. Explain why bees sting.

4. Explain swarming and describe why it happens.

5. Answer the question: "How do bees make honey?"

BACKGROUND: Bees are an integral part of agriculture. Although many plants are wind pollinated, bird or other insect pollinated, or hand pollinated by man, bees are indispensable for most of our fruit crops, nut crops, and vegetables. Many agriculturists actually rent colonies of bees during crucial periods of blossoming.

ACTIVITIES: 1. Have the students read pages 24-31 in "*Bud's World*".

2. Have the students unscramble the letters on page 24 to discover the names of plants which need honeybees.

QUEEN BEE

3. Label the bees: queen, drones, and workers.

4. Make an overhead transparency or copies of "Roles."

   a. Use it to explain the jobs that each bee does.

   b. Each of the workers' jobs have names:

DRONE BEE

   (1) house bee :
   - builds comb
   - helps manufacture honey
   - caps the cells filled with honey or eggs

   (2) nurse bee - cares for larvae
   (3) guard bee - protects the hive
   (4) field bee:
   - collects nectar and pollen
   - makes honey

   (5) temperature control bee
   - fans the hive to cool it
   - brings water to the hive to cool it by evaporation

   (6) scout bee - searches for a new home when the colony swarms

WORKER BEE

5. Make an overhead transparency of the life cycle of the honeybee and discuss it with the students.

6. Discuss what would happen if there were no honey bees! For example - no apples, no almonds.

7. Bring a beekeeper (apiculturist) into the classroom as a guest lecturer.

8. Take a field trip to an apiary.

9. Discuss "bee stings". Have the students relate their experiences.

10. Compare the bee colony to the family structure:

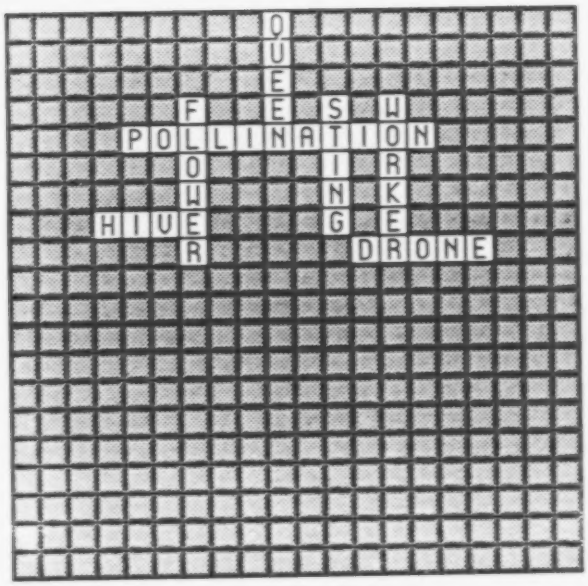
    "Who is the 'queen' in your family?"
    "What jobs does each person do?"
    "How is the hive similar to your home?"
    "How is the hive different from your home?"
    "What are the bee's rights?"
    "What are the bee's responsibilities?"
    "What happens if one bee doesn't do his or her job?" "How does that compare to humans?"
    "What would happen to the hive if the bees didn't follow the rules?"

11. Show the filmstrip, *"Insects: How They Help Us* (see Resource Guide).

12. Show the film *A Visit to a Honey Bee Farm*, available on free loan (see page 48 in Resource Guide).

13. Have the students complete the crossword puzzle.

Answers: BEES



THE BEE - INFORMATION

One of plant's best friends is the honeybee. Many flowers rely on the honeybee to pollinate them. Beginning with the pussy willow in the early spring, honeybees pollinate:

maple trees	clover
dandelions	alfalfa
apple trees	squash
cherry trees	cucumbers
pear trees	pumpkins
strawberries	melons
blueberries	buckwheat
raspberries	goldenrod

Honeybees live in large groups. These groups are called colonies. The home for the colony is a beehive. In every colony there are three kinds of bees. There is a queen bee, plus drone bees, and worker bees.

The Queen

The queen bee lays the eggs. She is the largest bee in the colony. She will lay the eggs which will become the new workers, drones and queens. There is usually only one queen in the colony. She is fed and cared for by the workers. If she dies, the colony will fall apart. Without a queen, the colony will die. She maintains social order in the colony by secreting a chemical on her head called "pheromone".

The Drones

The drone bees are the male bees. They are slightly smaller than the queen. They have very fat bodies. The drones have to be fed by the workers. They do no work. Their job is to mate with the queen. In the fall when the honey supply is low, the workers will push the drones out of the hive. Their job is complete and the colony cannot afford to use the honey to feed them.

The Workers

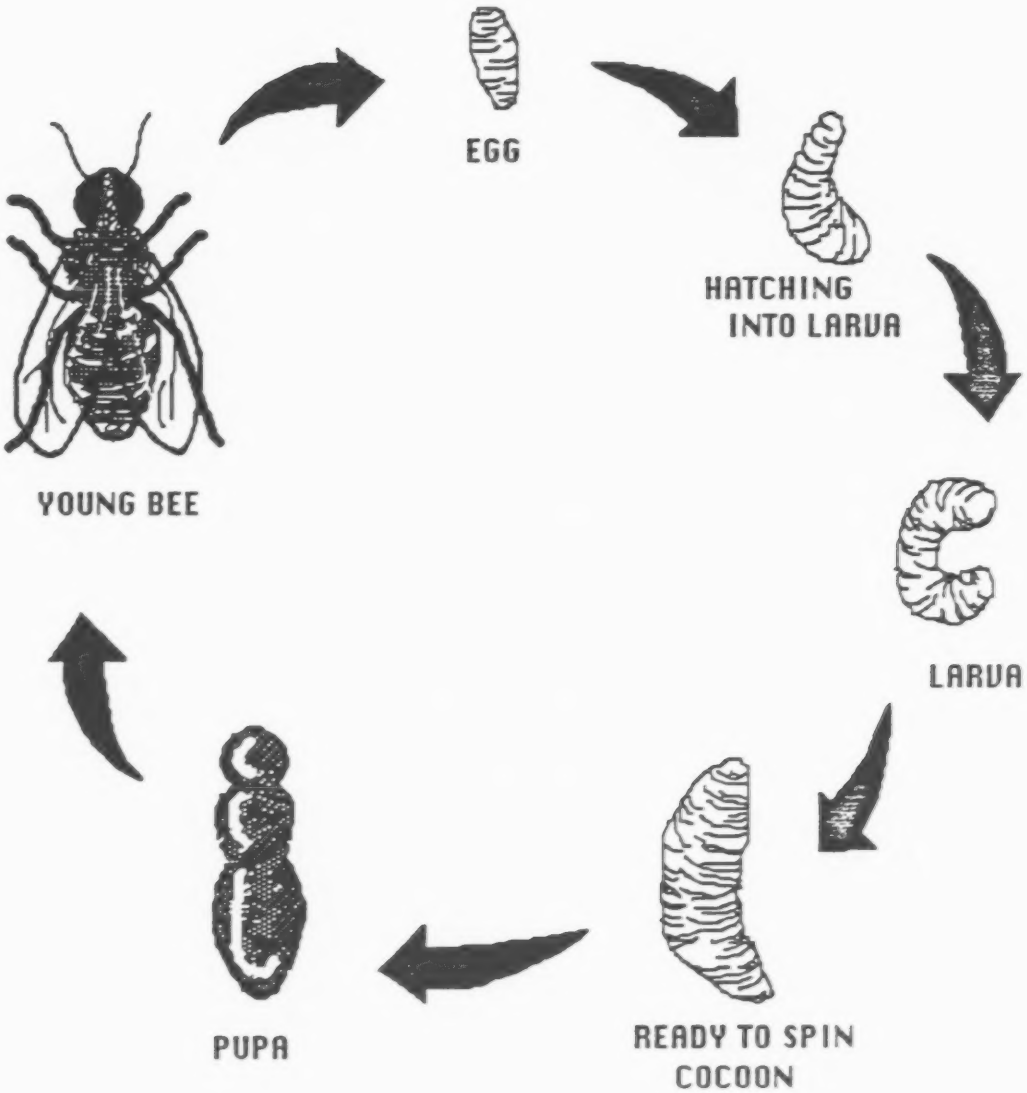
The worker bees are the smallest in the colony. Worker bees are sexually immature female bees. They are sterile. Most of the bees in the hive are worker bees. These are the bees we see pollinating flowers. By gathering nectar and pollen, the workers pollinate flowers. The worker bees do many jobs:

* Workers make wax to build the honeycomb
* Workers collect nectar and make honey out of it
* Workers make food and feed the colony
* Workers keep the hive clean
* Workers fan the hive to keep it cool
* Workers guard the hive

Workers have a "sting" at the tip of their body. The "sting" or "stinger" is attached to a gland which gives off a poison. That is one reason why a bee sting is so painful. When a honeybee stings a person or an animal, the bee dies. The stinger is the only protection a little bee has.

Honey is made by the workers and placed in honeycomb. The honeycomb is made of beeswax. Honey, and a special food called "bee bread" is stored to feed the colony. Honey is found in many forms.

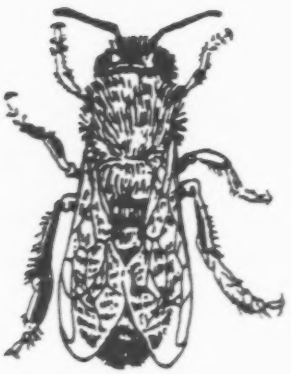
THE LIFE CYCLE OF THE HONEYBEE

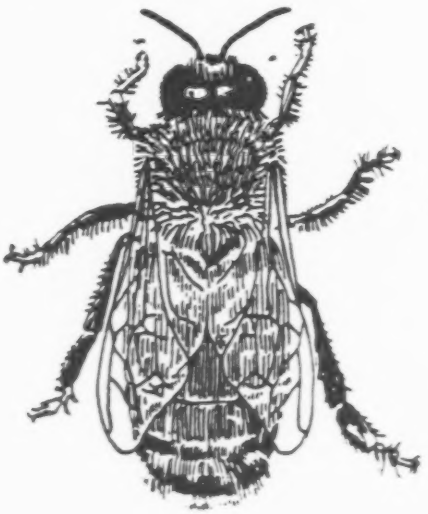


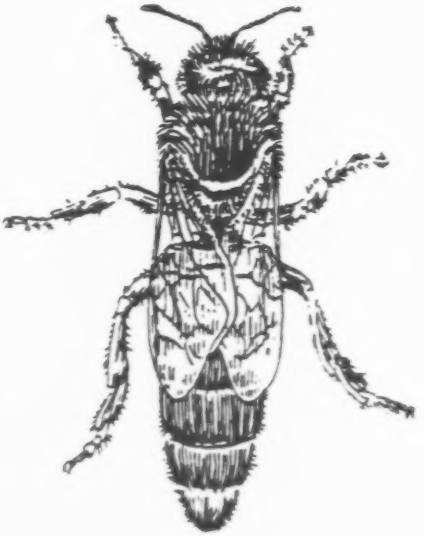
Name_____Date_____

THE HONEYBEE

Label the bees below: worker bee, drone bee or queen bee.
Then tell what each one's job or jobs are:







_____ _____ _____

This bee:_____ This bee:_____ This bee:_____

_____ _____ _____

_____ _____ _____

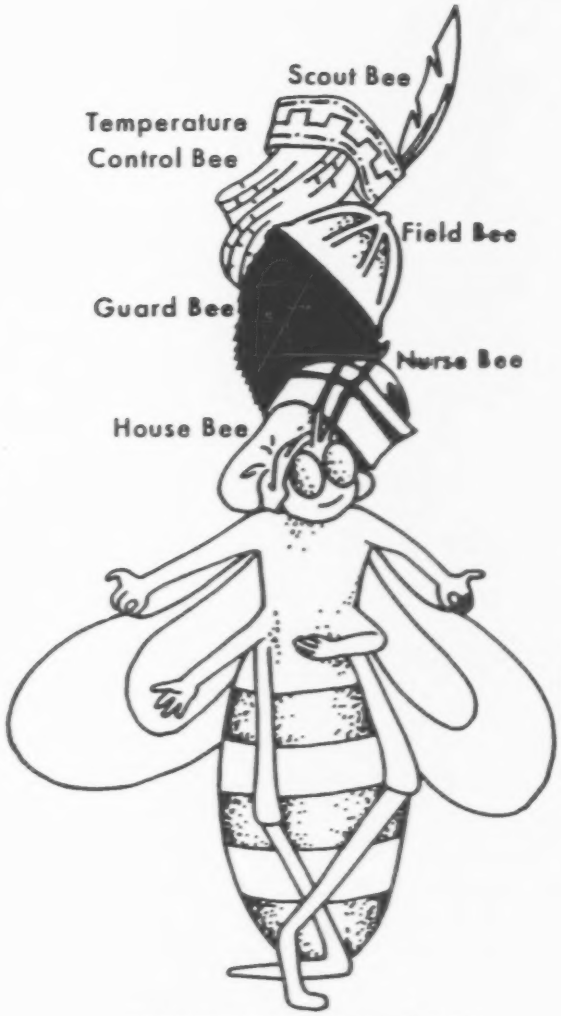
_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

ROLES



WORKER HONEY BEE

DRONE HONEY BEE

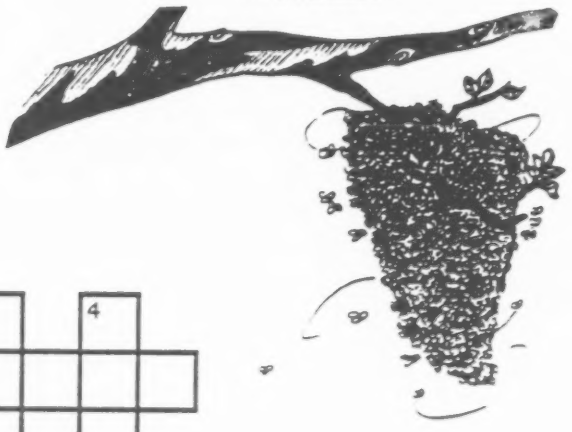
QUEEN HONEY BEE

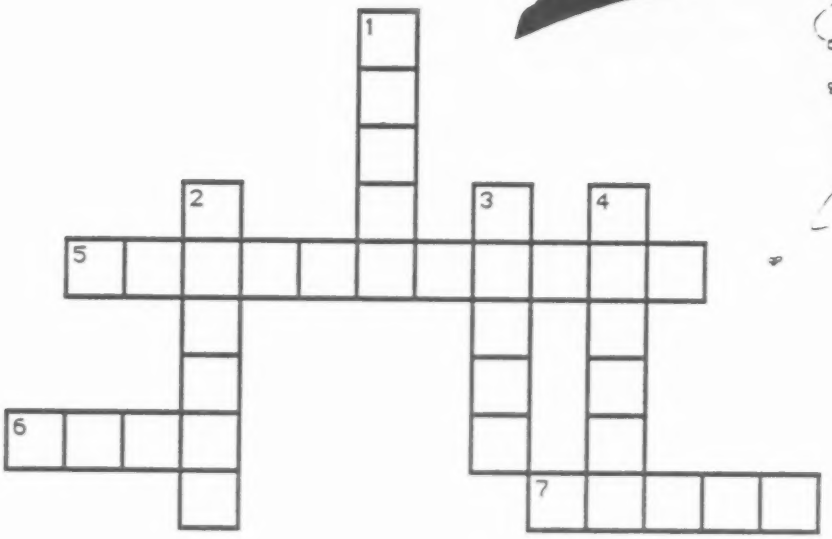
3-84

Name_____ Date_____

Use these words to complete the crossword puzzle:

DRONE
FLOWER
HIVE
POLLINATION
QUEEN
STING
WORKER



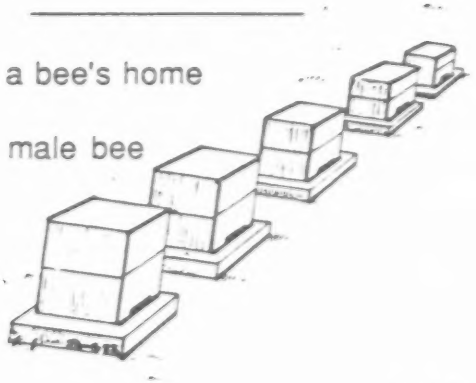


Across

5. Plants need bees for _____

6. a bee's home

7. male bee



Down

1. this bee is the boss

2. A ____ attracts bees with bright petals and a pretty scent.

4. the smallest bee in the hive

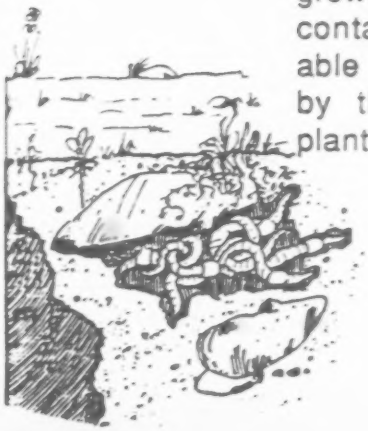
TEACHER MATERIALS

CONCEPTS: Life Science - I B - 2 - Plants benefit from animals
- 3 - Animals depend upon other animals

Social Studies - environment

OBJECTIVES:
1. The students will be able to describe the effect earthworms have on soil and therefore, plants and food production.
2. The students will be able to identify which end of the earthworm is the "rear".
3. The students will be able to identify which end of the earthworm is the "front".
4. The students will be able to describe how an earthworm lives, works, and what it eats for food.

BACKGROUND: Earthworms perform an invaluable service to humanity. As they tunnel through the soil, they aerate (create air pockets), assist in decomposition, and assist in mixing soil. By improving the soil in these ways, earthworms aid in food production. A plant's roots need air as well as water. A fine, well drained soil containing organic matter is also very important to plant growth. The plant's roots need to have good contact with moist soil as well as to be able to grow through the soil. Earthworms, by their activity, improve soils and assist plants in this way.



ACTIVITIES: 1. Have the students read pages 32-33 in *"Bud's World"*.

2. Have the students complete the crossword puzzle.

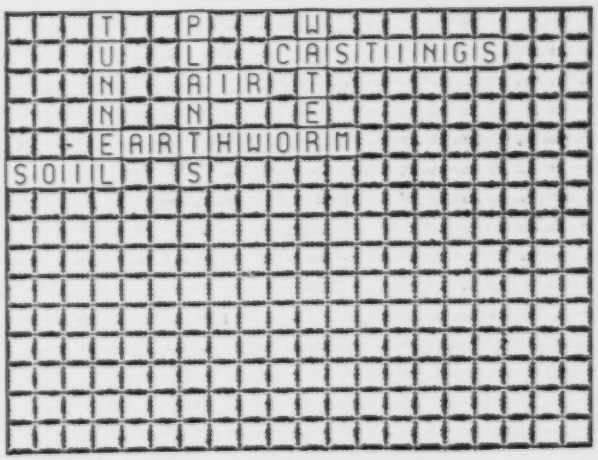
3. Have the students:

   a. Label the parts of the earthworm on the diagram in the book.

   b. Discuss their functions.

4. Follow Pages 88-91 in the Supplement to the Elementary Science Syllabus.

Answers: EARTHWORMS



INFORMATION - THE EARTHWORM

Honeybees are not the only animal that plants need. Earthworms are a good example. Under the soil, earthworms are working very hard.

Earthworms live by burrowing through the soil. As it digs, the earthworm eats dead things, soil, sand and even small pebbles. An earthworm can eat its own weight every day. It will leave its droppings on the top of the soil at night. These are called "castings".

The earthworm will also break up leaves. After the leaves are in small pieces it will drag them into its burrow.

All of this busy work helps plants. A plant's roots need equal parts of water and air. The tunnels left by the earthworm make air pockets in the soil. These tunnels also help water to move through the soil. This way a plant's roots don't get too much water. The dead leaves provide organic matter for the soil.

The earthworm has no head. The darker end that is pointed is the front. At the front is the "mouth". The students may label the front of this worm with the word "mouth". The rounded end is the "rear". It contains the anus. The student may label the rounded end "anus". The castings come from this end. Can you see the segments of the worm? By squeezing these round muscles, the worm moves. Ask the students: "Have you seen this happen?" The thick part of the worm is called the "clitellum". It is from here that the earthworm lays its eggs.

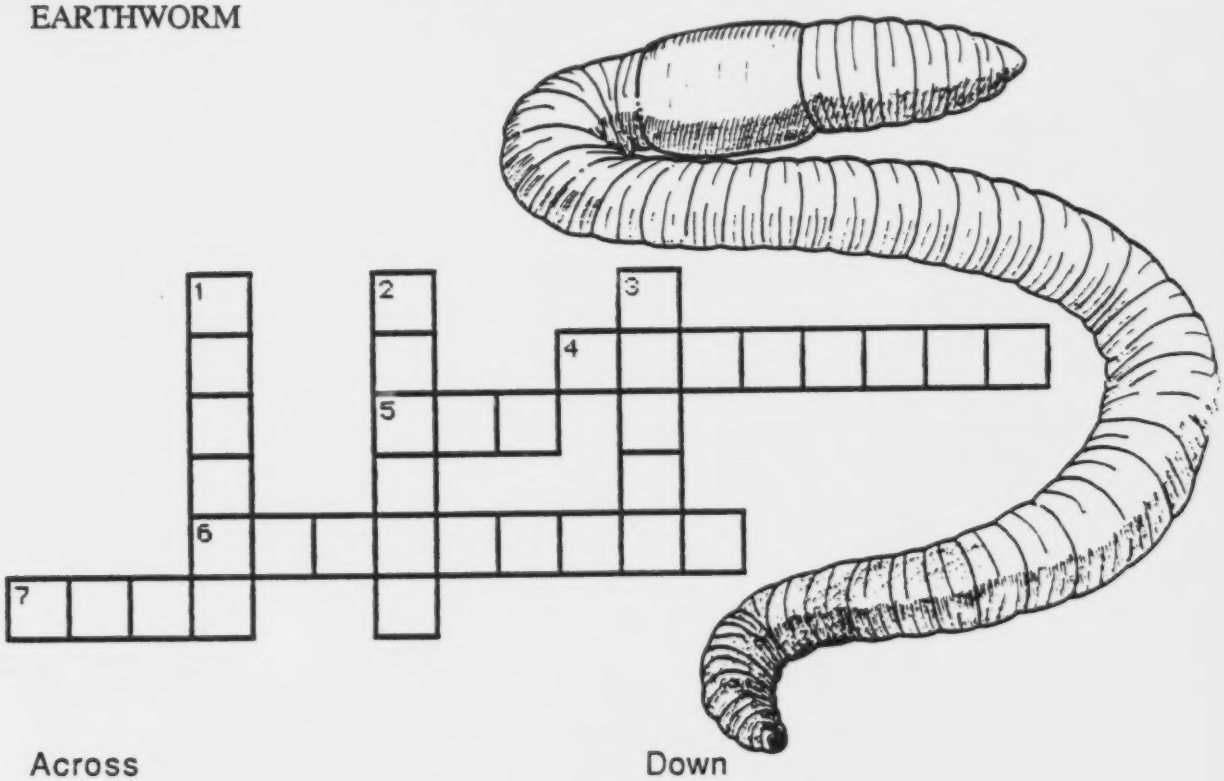
Have the students label the "clitellum".

VOCABULARY

Name_____ Date_____

Use these words to complete the puzzle.

AIR	PLANTS	TUNNEL
CASTINGS	SOIL	WATER
EARTHWORM		



Across

4. earthworm droppings

5. A plant's roots need equal parts of _____ and water.

6. another name for nightcrawler

7. Earthworms dig through the _____.

Down

1. An earthworm digs a _____ or a burrow.

2. _____ need worms to help their roots.

3. Earthworm burrows help move ____ away when it rains.

TEACHER MATERIALS

ARE OUR BODIES THE SAME?

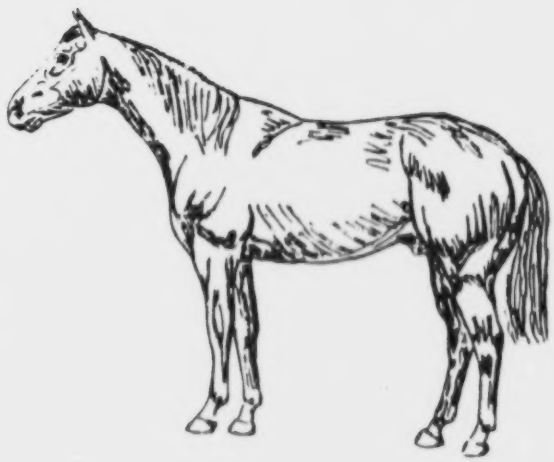
CONCEPTS: Life Science - I A - 2 animal properties
2.11, 2.12, 2.13, 2.14,
2.16, 2.17

OBJECTIVE: Students will recognize and label the gross anatomy of the horse, make visual comparisons to human anatomy and understand the properties of the horse that allow it to meet its needs and thrive.

ACTIVITIES:

1. In a group, or alone, have the students complete the comparative anatomy worksheet and answer the questions at the end .

2. Compare the horse to other animals that the students may be familiar with.

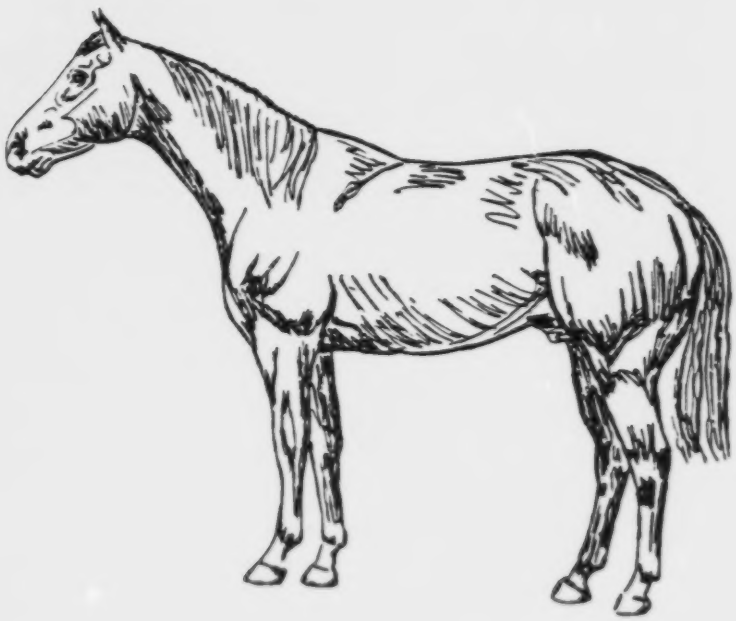


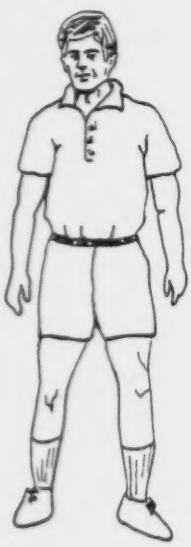
Name_____ Date_____

Are Our Bodies the Same?

Animals and people are very much alike, but also very different from each other. Many animals walk on four legs instead of only two as we do, but they still have legs. Some parts of an animal's body may seem the same as ours but have very different uses.

Look at the pictures below and match up the parts of your body that are the same as a horse's by putting the letter on that part of the man's and horse's body. For example - place a "B" on their eyes.





A. hair
B. eyes
C. ear
D. nose
E. mouth
F. neck
G. shoulder
H. chest
I. elbow (horse's front legs only)
J. feet
K. knees (horse's front legs only)
L. ankle

Some parts of a horse's body are different from ours:

Some parts of a horse's body are different from ours:

M. A horse's back legs, like most other 4 legged animals, do not have knees, instead they have hocks. Can you find this horse's hocks? Label them on the line next to them.

N. Some farm animals have one of these to help swat flies. A horse's is very long and made of hair. Can you guess what this is? Label line N with the name of this part.

O. On a horse, you put a saddle on this part of his body to ride him. Can you label line O with the name of this part. Now draw a saddle there.

Answer the following questions:

1. Many animals have body parts that helped them survive in the wild. Why do you think the horse has such large eyes and ears?

_____

_____

_____

_____

_____

2. Why do you think they have such long legs and hard hooves?

_____

_____

_____

_____

_____

4. A horse's nostrils are very big compared to ours. Can you think of any reasons why?

5. In the winter, a horse's hair or coat grows very long and bushy. He sheds many hairs in spring and has a shiny smooth coat in the summer. Why do you think these changes happen?

Does the same thing happen to people?_____Why or why not?_____

Name__*ANSWER KEY*_____Date_____

Are Our Bodies the Same?

Animals and people are very much alike, but also very different from each other. Many animals walk on four legs instead of only two as we do, but they still have legs. Some parts of an animal's body may seem the same as ours but have very different uses.

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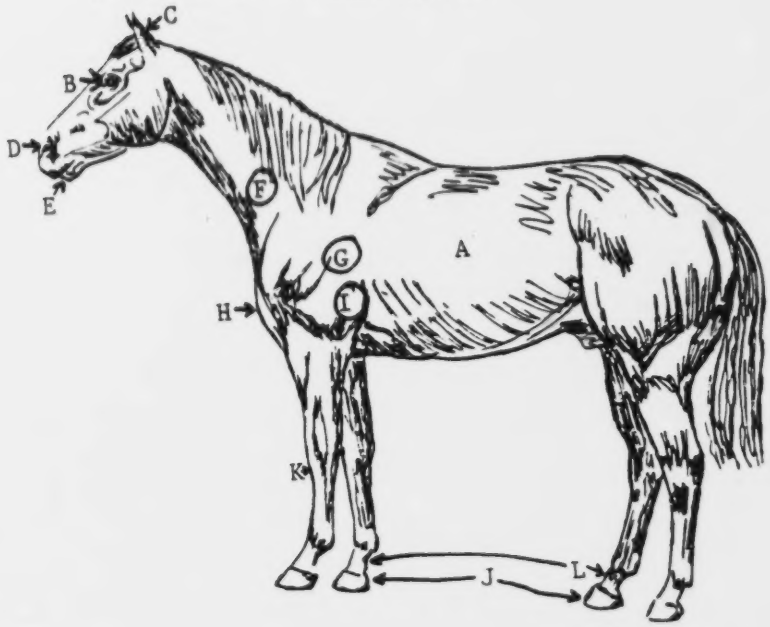

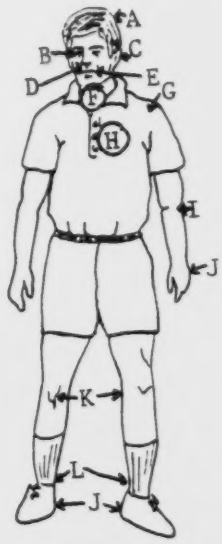

A. hair
B. eyes
C. ear
D. nose
E. mouth
F. neck
G. shoulder
H. chest
I. elbow
J. hand/feet
K. knees
L. ankle

Some parts of a horse's body are different from ours:

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O. On a horse, you put a saddle on this part of his body to ride him. Can you label line O with the name of this part? Now draw a saddle there.

Answer the following questions:

1. Many animals have body parts that helped them survive in the wild. Why do you think the horse has such large eyes and ears?

   to hear and see predators

2. Why do you think they have such long legs and hard hooves?

   to run fast

3. Horses like some other farm animals have big, flat teeth, unlike dogs and cats which have pointed sharp teeth. Why do you think this is so?

   to graze

4. A horse's nostrils are very big compared to ours. Can you think of any reasons why?

to smell food, water and predators

5. In the winter, a horse's hair or coat grows very long and bushy. He sheds many hairs in Spring and has a shiny smooth coat in the summer. Why do you think these changes happen?

to keep warm or cool depending upon the season

Does the same thing happen to people? No

Why or why not? we wear clothing

Social Studies - technology

TEACHER MATERIALS

CONCEPTS:

Social Studies	- technology
Life Science - I B-3	- animals depend on other animals

OBJECTIVE: The student will be able to trace the history of the horse's role in society, how it helped mankind to advance, and list reasons why the horse's function has changed.

BACKGROUND: The history of the horse's use in society is intertwined with man's history and technological developments. The horse was a very important part of man's history. For hundreds of years it was the main source of transportation, labor and helped people communicate over long distances. It was not until the invention of the railroad and later the gas engine and automobile that its use diminished and purpose in society changed.

ACTIVITIES:

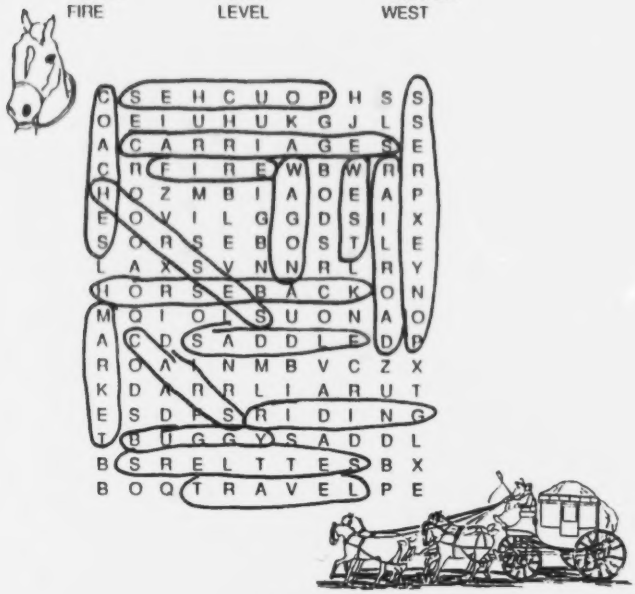
1. Have the students read the story "Horses for Travel".
2. Complete the word search.
3. Have the students read the story "The Draft Horse in History."
4. Have the students draw and name the matched items that have replaced the horse in modern society.
5. Complete the crossword puzzle "Horses in History."
6. Show the video, "Rumble of Wheels," available through Modern Talking Pictures (on a free loan basis).

VOCABULARY

Name Answers Date _____

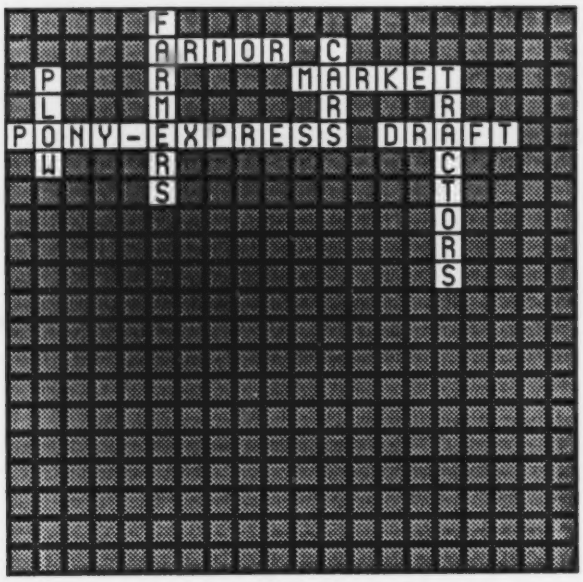
Find the words that relate to the story in the puzzle below. They may be spelled forward, backwards, up and down or slanting.

HORSEBACK	PONY EXPRESS	SADDLE
CARRIAGES	WAGON	TRAVEL
COACHES	SETTLERS	RAILROAD
HORSES	CARS	MARKET
RIDING	BUGGY	POUCHES
FIRE	LEVEL	WEST



3-106

ANSWERS: HORSES



VOCABULARY

Horseback-_____

Travel-_____

Carriage-_____

Coaches-_____

Pack animal-_____

Uncomfortable-_____

Breed-_____

Discovered-_____

Farm products-_____

Buggies-_____

Pony express-_____

Wagon-_____

Settlers-_____

Saddle-_____

Railroad-_____

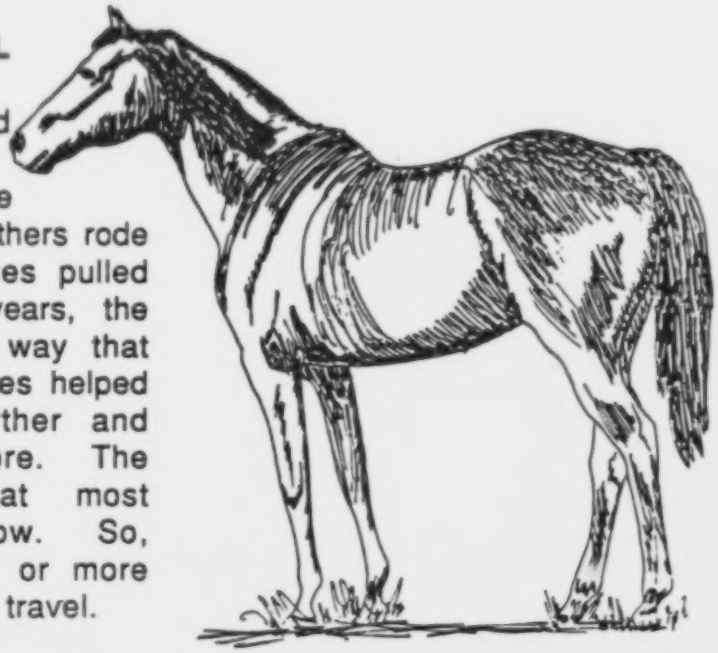
Market-_____

Warriors-_____

Battle-_____

Knights-_____

HORSES FOR TRAVEL

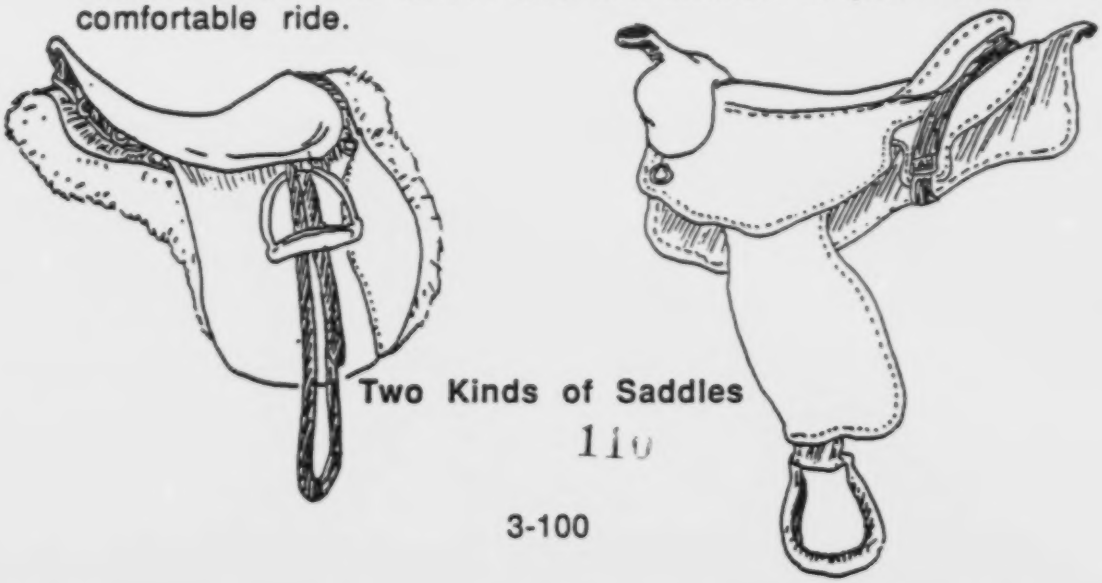


Before cars, trains and planes, people used horses to travel. Some rode on horseback. Others rode in carriages or coaches pulled by horses. For many years, the horse was the main way that people traveled. Horses helped people to travel farther and faster than ever before. The large work horses that most people had were slow. So, people also had one or more small fast horses for travel.

Almost all of the things that run on motors today were pulled by horses in the 1800's. The horse has been an important part of our history.

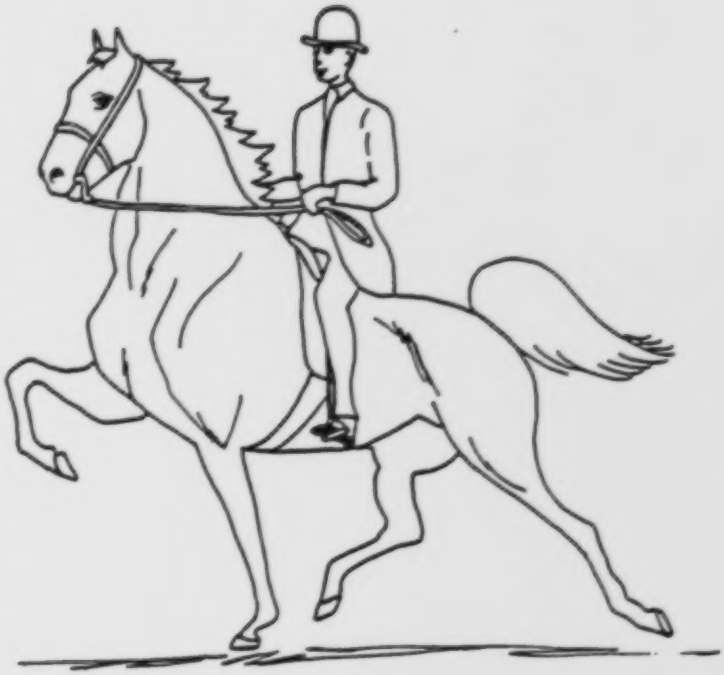
Riding is Faster

The horse was first used by people as a pack animal. It carried heavy things on its back while someone walked next to it. People then figured out that they could travel faster if they rode on the horse's back. By riding horses, people were able to travel to places in a shorter time than when they walked there. Riding for long trips was very uncomfortable. The saddle was then invented to give a more comfortable ride.

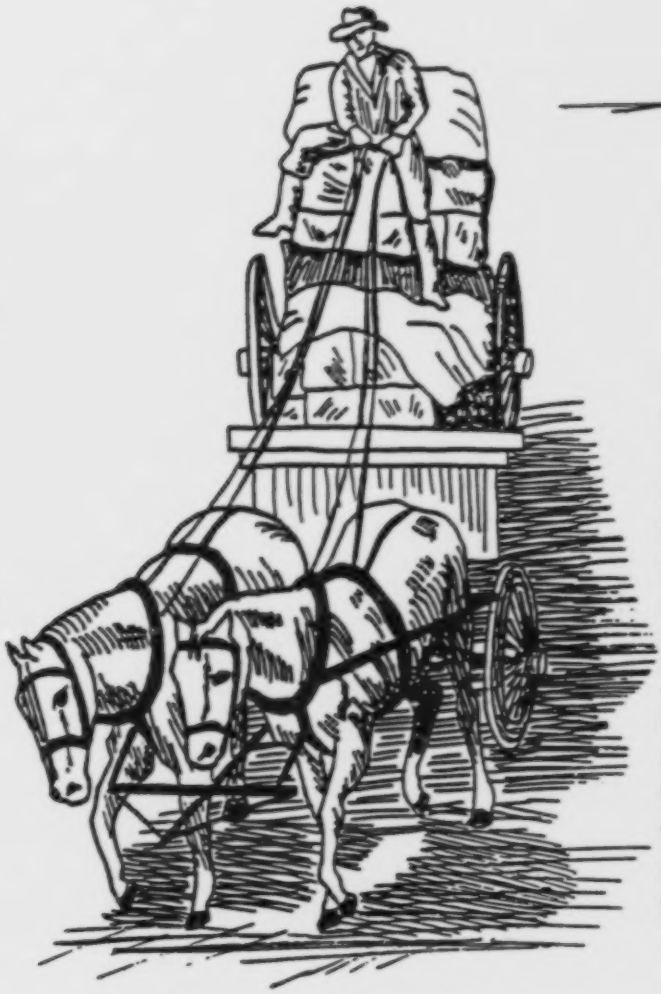


Two Kinds of Saddles

Special breeds or kinds of horses were developed to make riding easier. A favorite breed was the Tennessee Walking Horse. This horse was more comfortable and less bumpy to ride than other breeds.



Tennessee Walking Horse

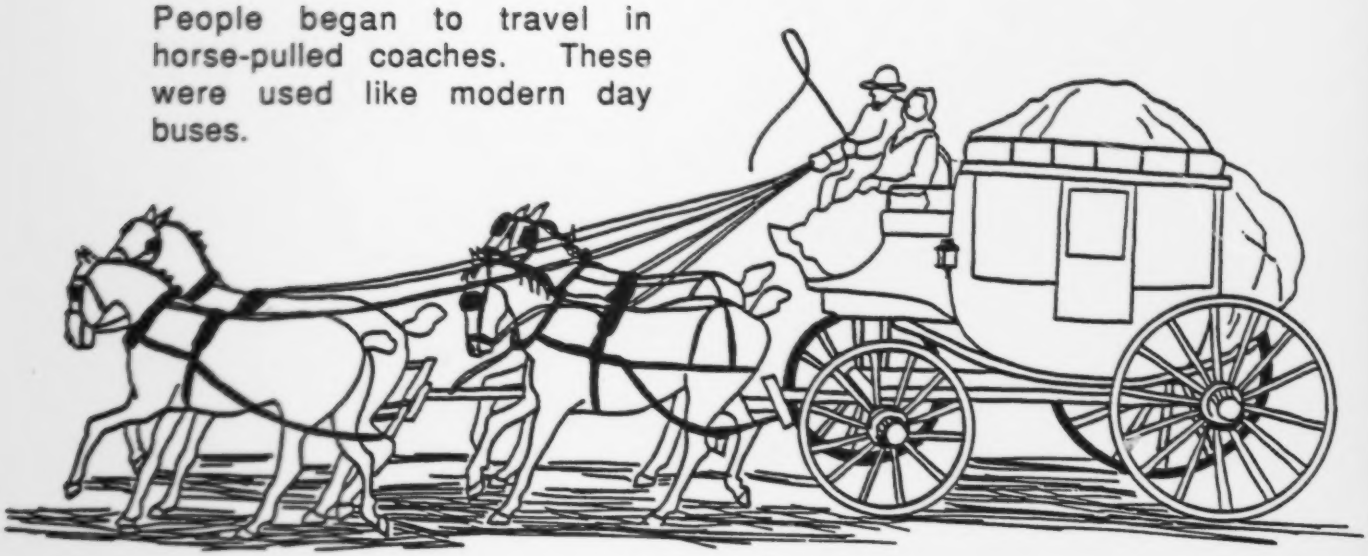


Going to Market

Wagons and Carriages

One problem with riding a horse was that if there were heavy things to be carried or moved, many horses were needed. It was discovered that a wagon could be hooked to a horse to pull heavy things easily. Farm products were then pulled to markets in wagons. This led to other ideas on how to use the horse to move things.

People began to travel in horse-pulled coaches. These were used like modern day buses.



Coach

One or two people traveled in small buggies. Carriages and buggies were used just as cars are today. Trips to town were made by horse and carriage.

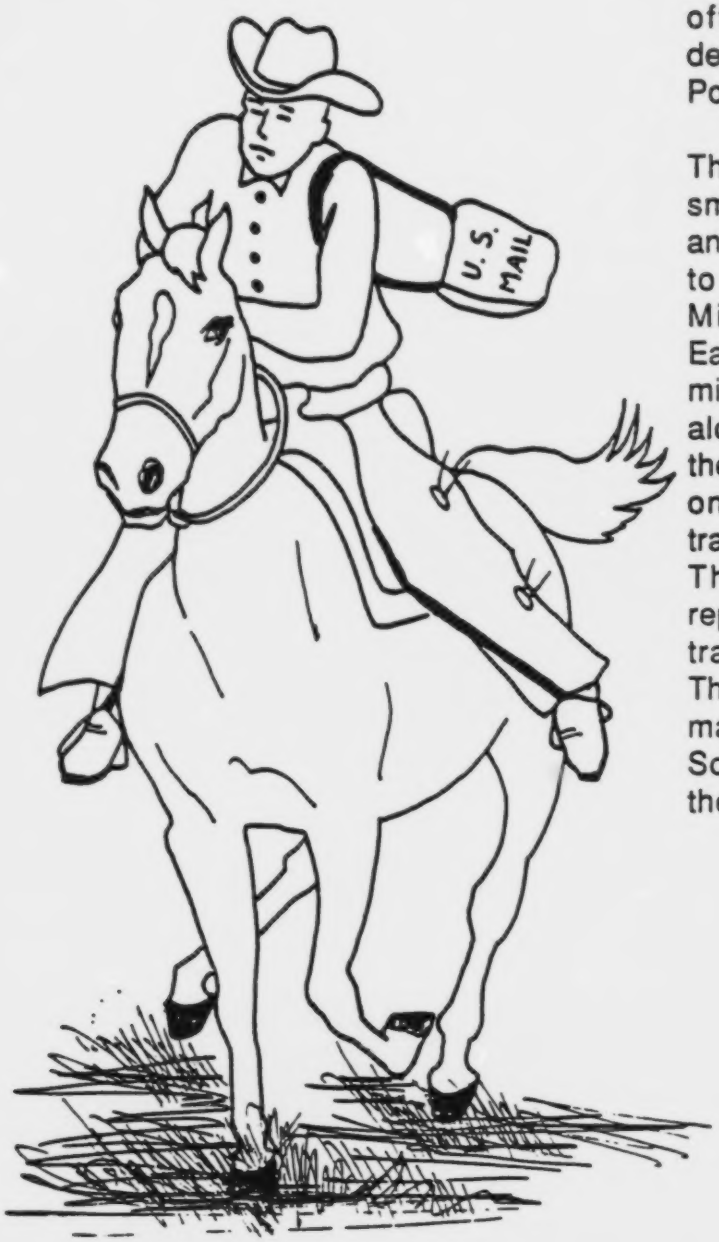
A breed of horse called the Morgan Horse was very good for pulling carriages and buggies. It was a very strong and fast horse.

Buggy

Mail Carriers

The mail was carried by ship, on horseback and in carriages pulled by horses in the 1860's. It would often take months to deliver a letter. Then the Pony Express was created.

The mail was placed in small pouches. Very fast and tough horses were used to carry the mail from Missouri to California. Each horse ran about 12-15 miles. Stops were made along the way to replace the tired horse with a new one. Each rider would travel as long as he could. Then the rider was replaced. The mail would travel for days this way. The Pony Express made the mail travel much faster. Soon it was replaced by the railroad.

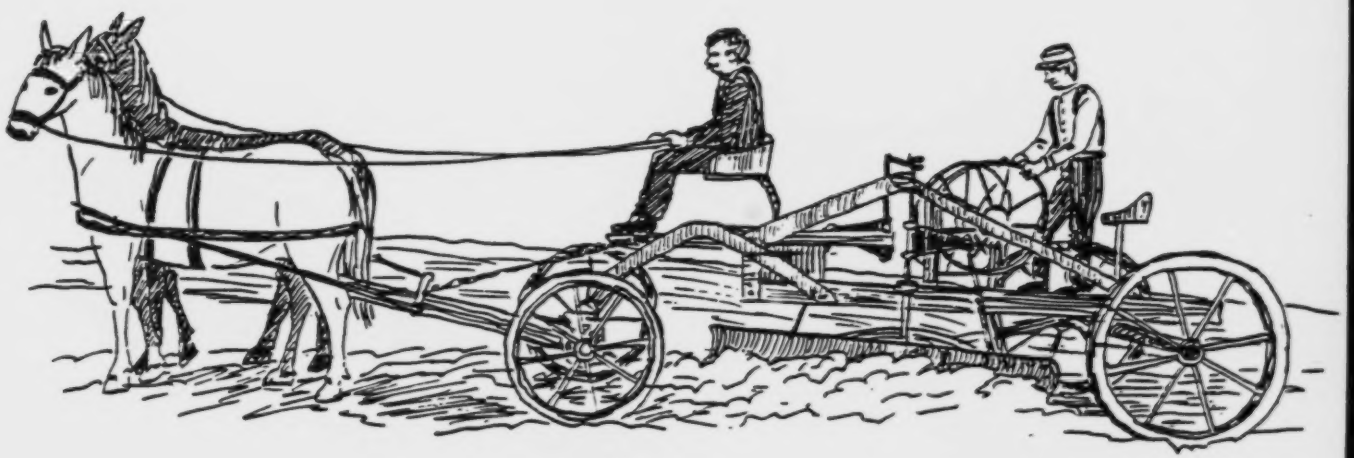


Pony Express

Machine Pullers

Many machines needed horses to work. Machines also needed horses to move. Horses were used to pull fire engines to burning buildings.

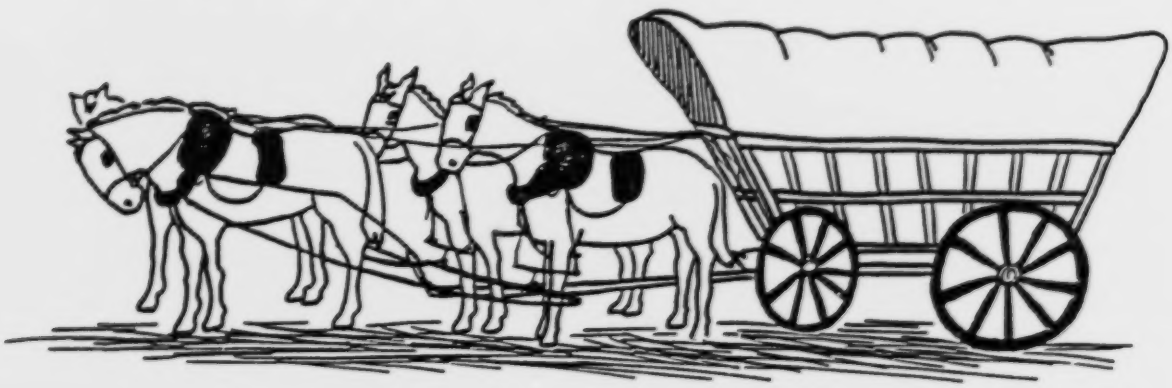
Other machines, like snow plows and road graders to level dirt roads, also needed horses to pull them. Even boats were pulled down rivers and canals by horses.



Dirt Roads Need to be Made Level

Moving West

Much of the western part of the United States was discovered on horseback. When the pioneers moved west they used covered wagons pulled by horses to carry their belongings. Oxen were also used, but they were very slow. With oxen, pioneers could only travel about 4 miles a day. For a big family, this meant that they would have to carry a very large food supply for a long trip. By using horses, they could travel about 10 miles a day. This made their trip much quicker. The early settlers used horses for all of their travelling. In some cases, it was better to use oxen. Their feet were harder and they could climb better. They also needed less feed and water than horses.



Wagon Trains Moved Slowly

Once the railroad was invented, people traveled long distances by train. It was much faster than when using horses. People still used horses to carry farm products to market, to ride into town and for many of the things we use cars for today. It was not until the 1930's when cars replaced the horse for travel that the number of horses in America dropped. Since then, most people ride horses just for enjoyment and fun. Cars, buses, trains and airplanes are now used to transport people wherever they want to go.

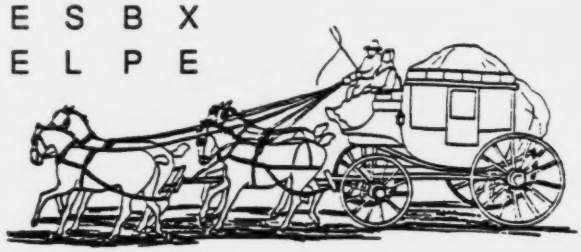
VOCABULARY

Name_____Date_____

Find the words that relate to the story in the puzzle below. They may be spelled forward, backwards, up and down or slanting.

HORSEBACK	PONY EXPRESS	SADDLE
CARRIAGES	WAGON	TRAVEL
COACHES	SETTLERS	RAILROAD
HORSES	CARS	MARKET
RIDING	BUGGY	POUCHES
FIRE	LEVEL	WEST

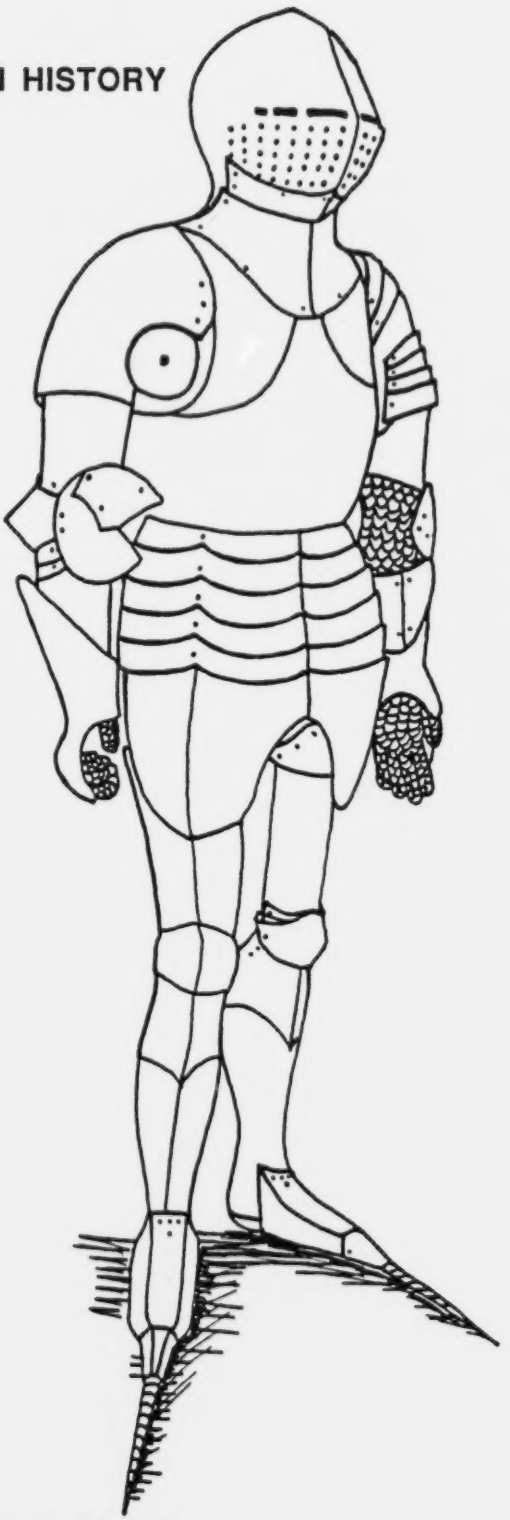
C S E H C U O P H S S
O E I U H U K G J L S
A C A R R I A G E S E
C R F I R E W B W R R
H O Z M B I A O E A P
E O V I L G G D S I X
S O R S E B O S T L E
L A X S V N N R L R Y
H O R S E B A C K O N
M Q I O L S U O N A O
A C D S A D D L E D P
R O A I N M B V C Z X
K D A R R L I A R U T
E S D F S R I D I N G
T B U G G Y S A D D L
B S R E L T T E S B X
B O Q T R A V E L P E



THE DRAFT HORSE IN HISTORY

The War Horse

The horse has been one of man's most important animals. One of the first uses of the horse was in war. People began by using horses to fight battles. They were faster and stronger than men on foot. The warriors with horses won. Many men then began to use horses in battle. During the 1500's, large, strong horses were used to carry men in war. These men were called knights. They wore suits of armor to protect them from their enemies. The armor that knights wore could weigh as much as 300 pounds.



Knight in Full Suit of Armor

The horse often wore armor too. It also weighed 300 to 400 pounds. These horses, called "chargers" had to be very strong to carry this heavy armor and the knight too. These horses were very tall and thick. They had thick legs, very large bones and huge round feet.

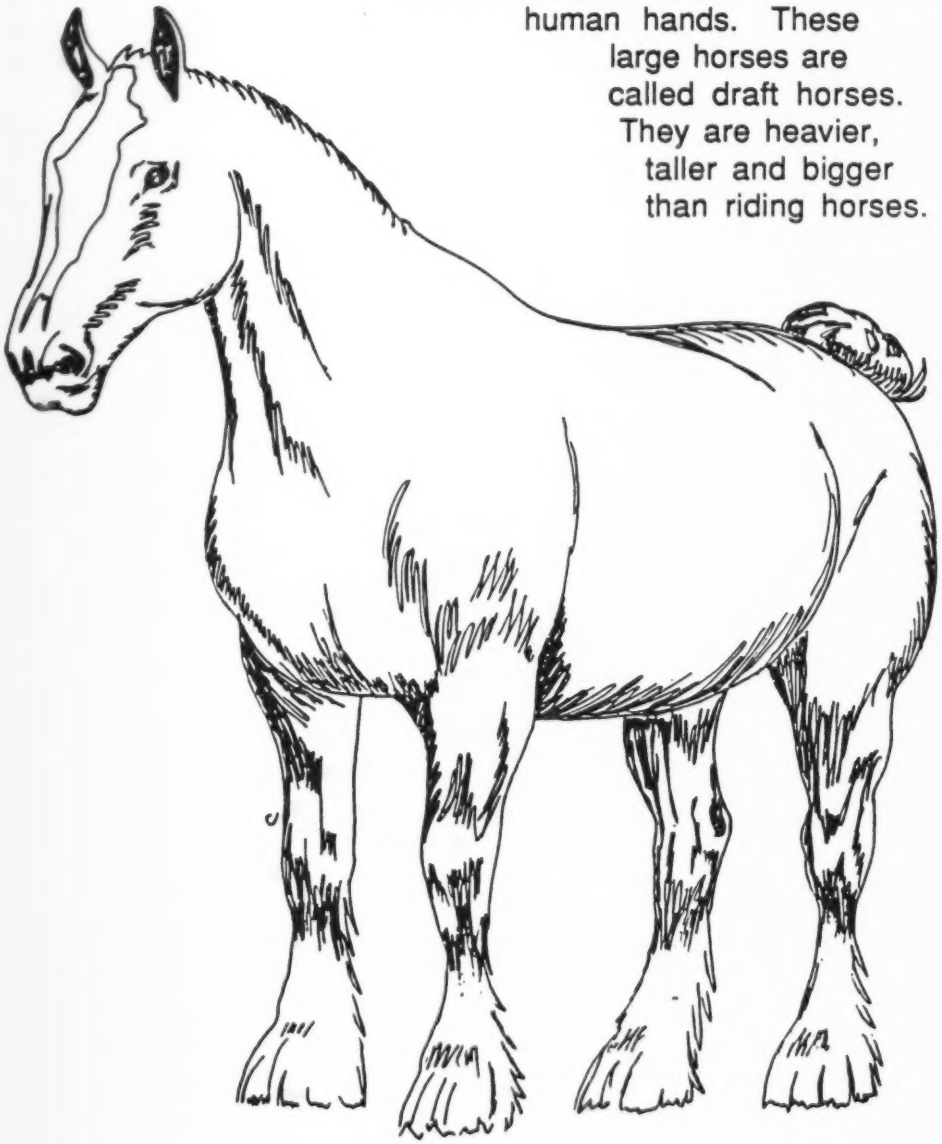
Knight in Full Armor on a Horse With Full Armor

After the middle ages, war changed. The knight in armor on large strong horses gave way to men on light fast horses. Groups of men on faster, smaller horses could charge their enemy as well as travel quickly on their horses. These men were known as Cavalry.

The Working Horse

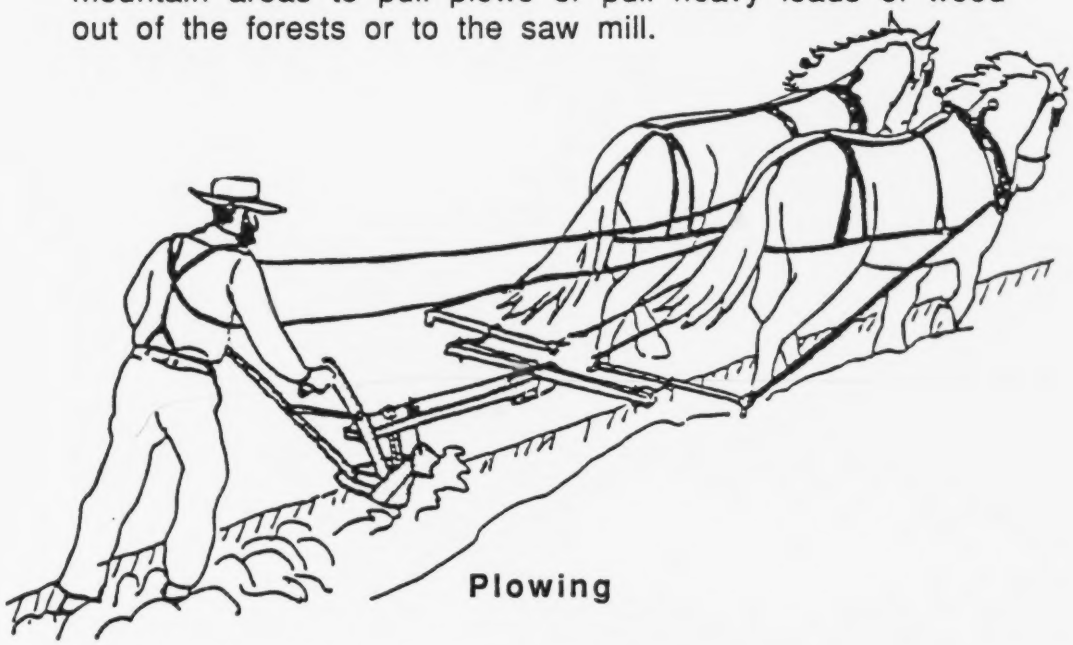
When they were no longer used for war, the large, slow horses were then used mostly for farming. It is hard for us to imagine, but right into this century, the horse did almost all of the work in the United States. It is only recently that the horse as a worker has disappeared from our everyday life.

By using the largest and strongest horses as a work animal, farming was much faster and easier than when done by human hands. These large horses are called draft horses. They are heavier, taller and bigger than riding horses.



The Draft Horse

When the draft horse was used to work, a heavy collar was worn around its neck. This helped take most of the strain on its strong shoulders while it pulled a plow through the soil. The farmer walked behind this simple plow to guide the horse's path. In later years, a plow that the farmer could ride on was used. This helped the farmer plow more soil in a shorter time. The large draft horse also carried food products to market and helped to clear forests by pulling large logs after the trees had been cut down. A large draft horse can pull about 5 tons or 10,000 pounds. This has made it a very useful animal. In many countries today, draft horses are still used in rocky, mountain areas to pull plows or pull heavy loads of wood out of the forests or to the saw mill.



Plowing

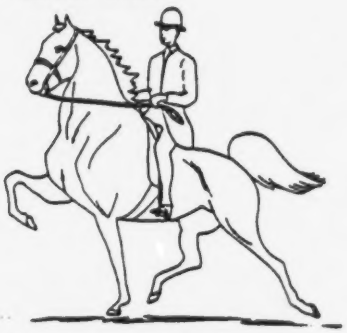
During World War I machines were invented that could do heavy work better than horses could. Today, tanks and airplanes have taken the place of horses in war, and tractors have replaced them in farming. Most of the draft horses in the United States today no longer have to pull a plow and are used mostly in shows and parades. These gentle giants will always be an important part of man's history. They will be remembered for the hard work they did that helped man change from hunting his food to farming it.

Name_____Date_____

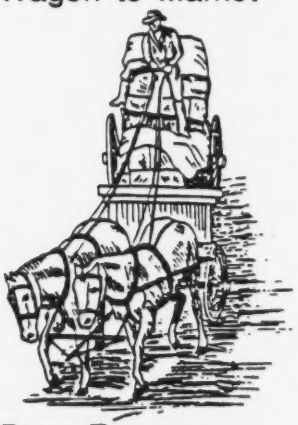
Match the use of the horse described on the right with the vehicle that has replaced it today by drawing a picture next to it. Write its name on the line.

1800's **Today**

Horse back _____



Wagon to Market _____



Pony Express _____

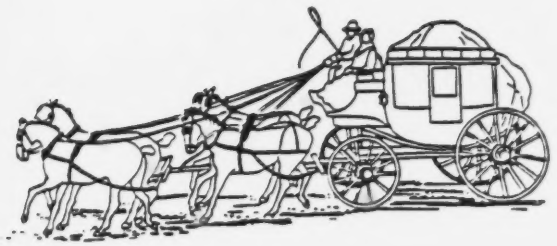
Name_____Date_____

Match the use of the horse described on the right with the vehicle that has replaced it today by drawing a picture next to it. Write its name on the line.

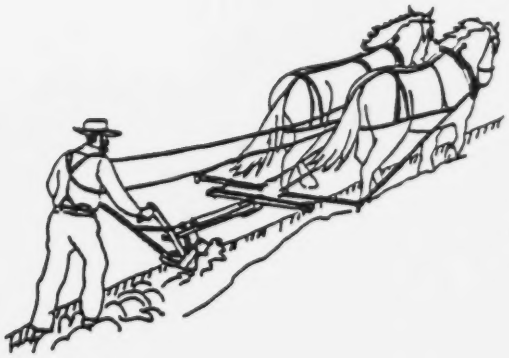
1800's **Today**

Westward Bound
Covered Wagon _____

Stage Coach _____



Agricultural Work _____



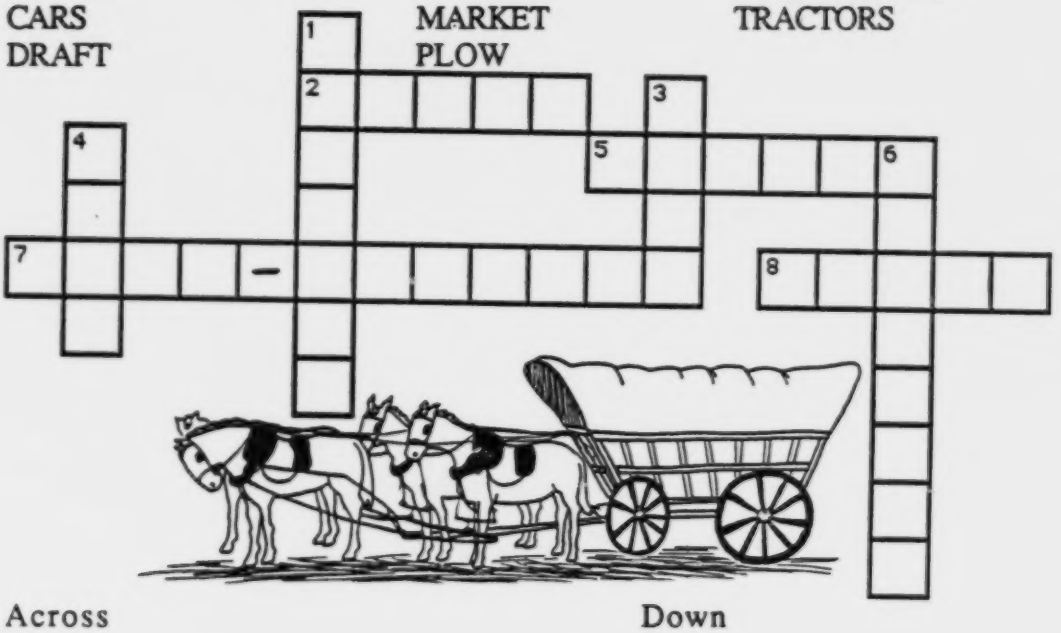
VOCABULARY

Name_____Date_____

HORSES IN HISTORY

Use these words to complete the crossword puzzle:

ARMOR
CARS
DRAFT
FARMERS
MARKET
PLOW
PONY-EXPRESS
TRACTORS



Across

2. Knights wore heavy _____ to protect them from their enemies.

5. The horse helped carry food products to _____.

7. Small, fast horses were used to carry mail for the _____-_____ .

8. Large _____ horses were used as work animals on many farms.

Down

1. The horse helped people change from hunters to _____.

3. These have replaced the use of the horse for travel.

4. By hitching a horse to a _____ , farming was made easier.

6. These have replaced horses on farms.

TEACHER MATERIALS

CONCEPTS:

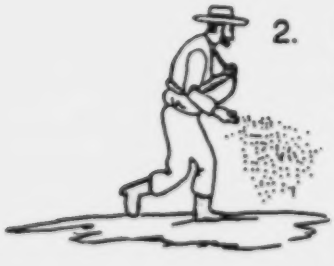
Social Studies	- change - environment - technology	People adapt or change their environment to meet their needs and wants
Life Science	- I B - 1, 3	
Reading	- comprehension - sequential order - making titles - vocabulary	

OBJECTIVE: The students will be able to describe the progress of humans in feeding themselves.

BACKGROUND: Although the history of mankind is most often described by looking at the chronicles of war, much of the progress of mankind has been made in providing food, clothing, shelter and health care. In this past century alone, most of the progress we have made in increasing life span in the United States has been due to improved nutrition and sanitation rather than intricate surgical techniques or complex vaccines. This activity traces the progress of mankind through time to produce food, wheat in particular.

ACTIVITIES:

1. Make copies of "Food Though the Ages" - one for each student.



2. Have the students read each section of "Food Through the Ages."

3. After each picture, on the line provided, have the students title the pictures and place each in sequential order in a booklet or on the bulletin board. There should be one large title for the era portrayed. (These titles are provided.) The students may enjoy coloring the drawings.

4. When the bulletin board, wall, or booklet is complete, discuss how slow progress was until recently. Then compare how quickly change occurs today.

5. Discuss with the students how much time was needed to obtain food and how little time we spend today in comparison.

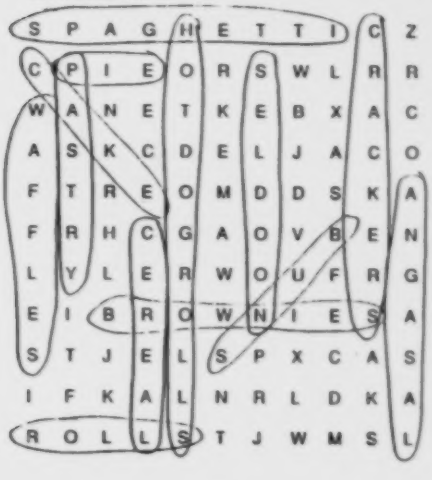
6. Utilize the booklet *Everything You Ever Wanted to Know About Wheat* in the resource section.

Vocabulary

Name ANSWER KEY Date _____

Find these words of Foods made from Wheat:

SPAGHETTI	CRACKERS	WAFFLES
PIE	CEREAL	BROWNIES
PASTRY	NOODLES	LASAGNA
ROLLS	BUNS	CAKE
HOTDOGROLLS		


S P A G H E T T I C Z
C P I E O R S W L R R
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A S K C D E L J A C O
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S T J E L S P X C A S
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3-115

- FOOD THROUGH THE AGES

- THE STONE AGE

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FOOD THROUGH THE AGES

The need for food, clothing, and shelter is basic. Since humans first walked the earth we have spent our time finding ways to meet those needs. The time and effort to get food, for example, has dropped. There are also fewer people spending their time working to make or grow food.

The Stone Age

Humans first got food by hunting for it. Men, women and children spent almost all of their time searching for food. Food could be insects, seeds, roots, berries, nuts, leaves or meat. Insects? Yes, insects were eaten for food. In fact, in some places, insects are still eaten today.

Meat was hunted by using stone tools. Throwing a rock at a small animal was the first way of hunting.

Then spears, clubs and stone axes were made. Meat was eaten raw until fire was discovered. The skins of the animals killed for meat were worn as clothing.

Roots were dug out of the ground using sharp sticks.

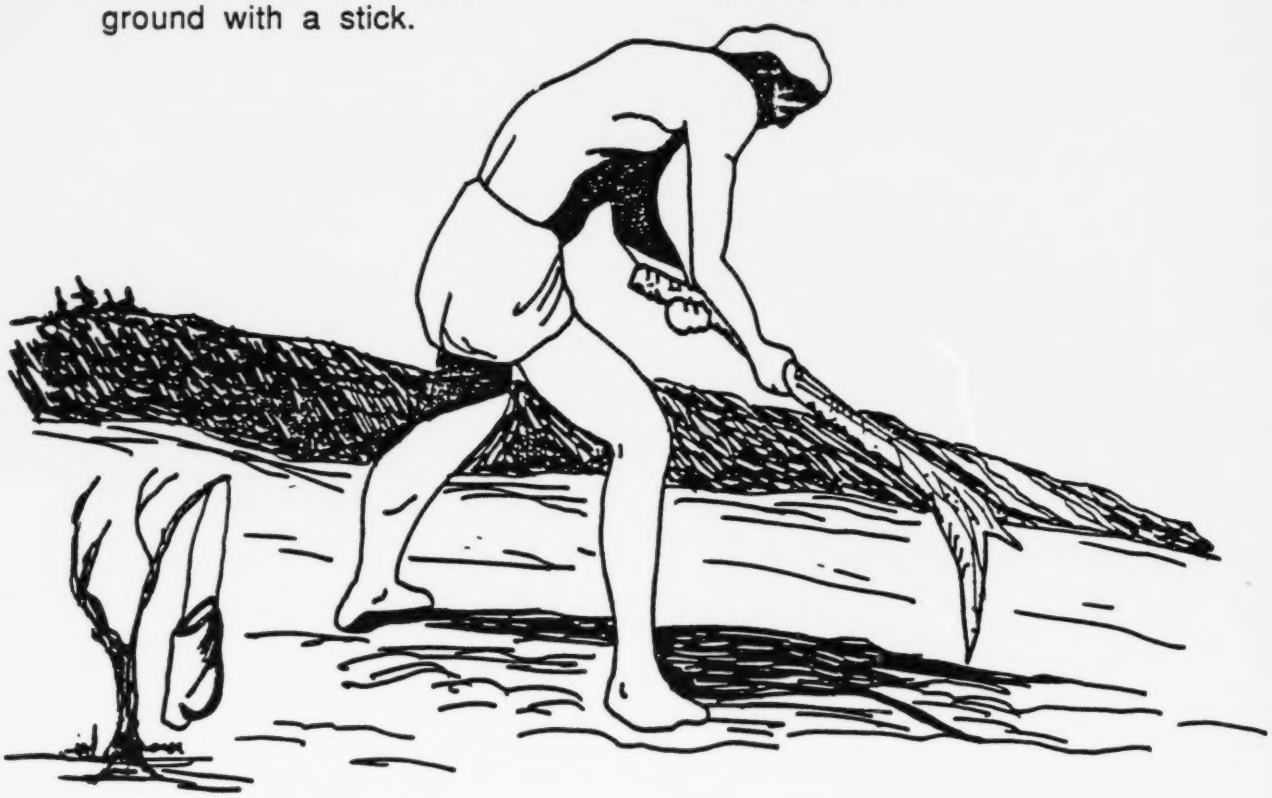
Some roots were pounded up into a type of flour. The "flour" would then be mixed with berries which were gathered. Roots and fruits would sometimes be stored.

Often there were times when there was a lot of food to be gathered. When food was scarce the people went hungry. They had to move all the time to find food. It took a very large area to feed people this way. Everyone spent most of their time looking for food and bringing it home.

Early Civilization

No one knows exactly where or when humans learned that they could grow food. But that idea is what created civilization. You see, in order for humans to plant and harvest food they had to stay in one place. If they stayed in one place they had to make sure that all their needs would be met. In order to get meat they had to tame wild animals. To live through bad weather they had to build stronger homes and wear warmer clothes. So, a town was born.

How did these people grow food? They dug a hole in the ground with a stick.



This digging stick was quite an invention. Behind the person with the digging stick another person dropped a seed in the hole and covered up the seed.

The seed was carefully saved from one year to the next. As the grain grew ripe it was cut with a sharp stone.

It was then ground up between two stones. This kind of flour was mixed with berries and meat. The food was coarse and had small pieces of gravel in it. People's teeth wore out quickly.

Early civilization had problems getting all the right food. They began to trade with other groups to get what they needed.

Most people worked to get food, clothing and shelter. But this is the beginning of humans being able to specialize. There were some artists, traders, teachers and religious leaders.

Vocabulary

Name_____Date_____

Define these words by looking them up in a dictionary.

Clothing-_____

_____

Shelter-_____

_____

Effort-_____

_____

Example-_____

_____

Searching-_____

_____

Basic-_____

_____

Gathered-_____

_____

Created-_____

_____

Civilization-_____

_____

Tame-_____

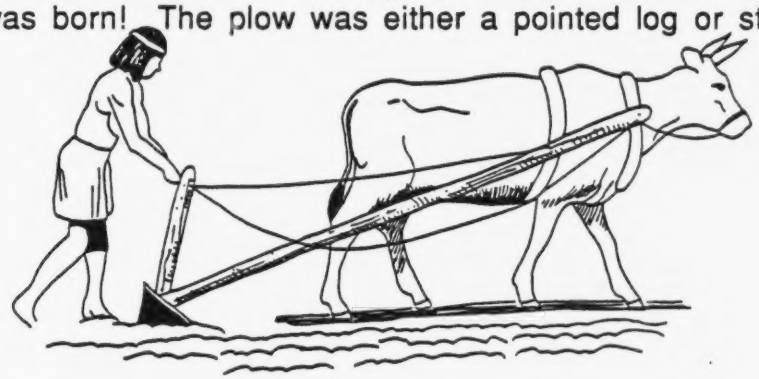
_____

Invention-_____

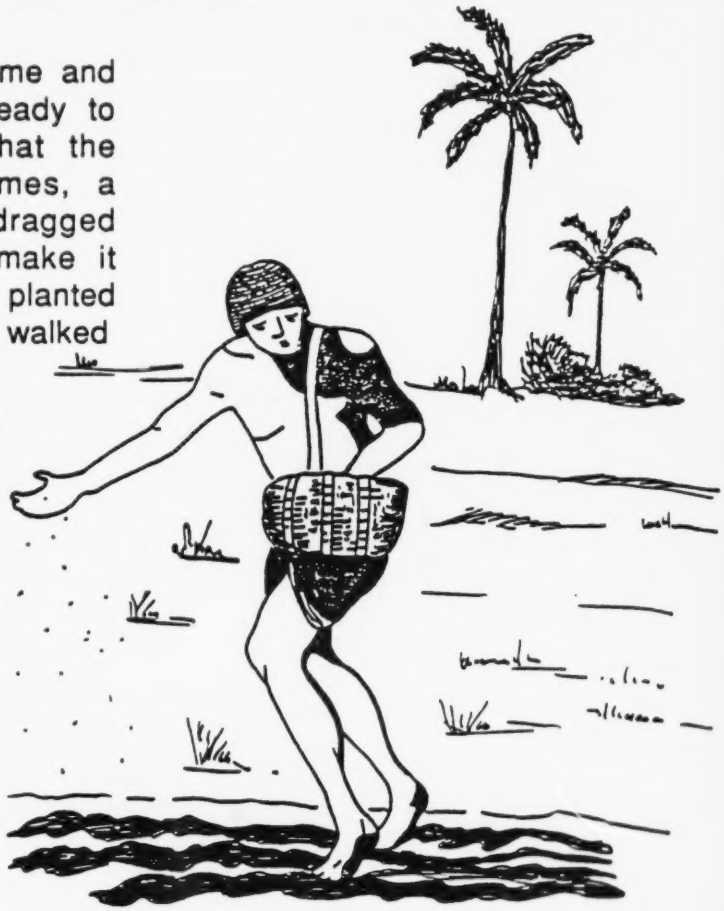
_____

Ancient Egypt

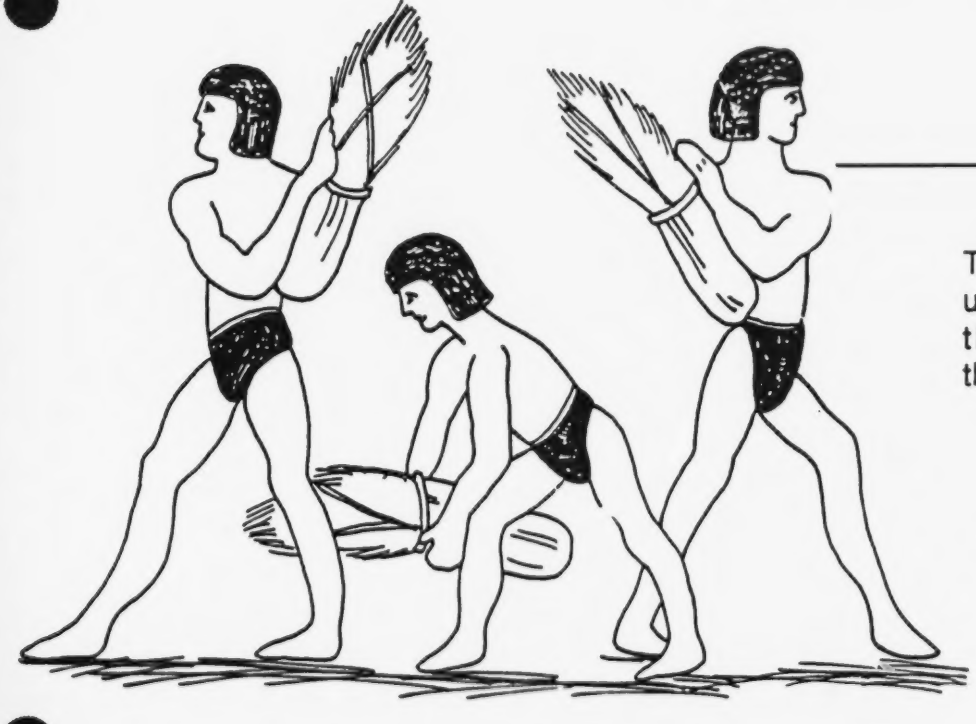
When people learned that animals could work for them, life changed. Animals were first used as carriers. Then it was found that with a larger digging stick the cattle, buffalo, mules or horses could dig up larger areas of soil. The plow was born! The plow was either a pointed log or stone.



This saved a great deal of time and more land could be made ready to plant. It was also seen that the plants grew better. Sometimes, a branch from a tree was dragged across the plowed field to make it more level. The seed was planted by sprinkling it as a person walked across the field. As people got better at spreading the seed they would actually just toss the seed. As the arm moves to toss, the seed was allowed to trickle through the fingers. This type of planting was called broadcast seeding. The seed was not covered by soil, so not all the seed would grow. Some of the seed would be eaten by birds. But this way of planting was much faster than with a digging stick.

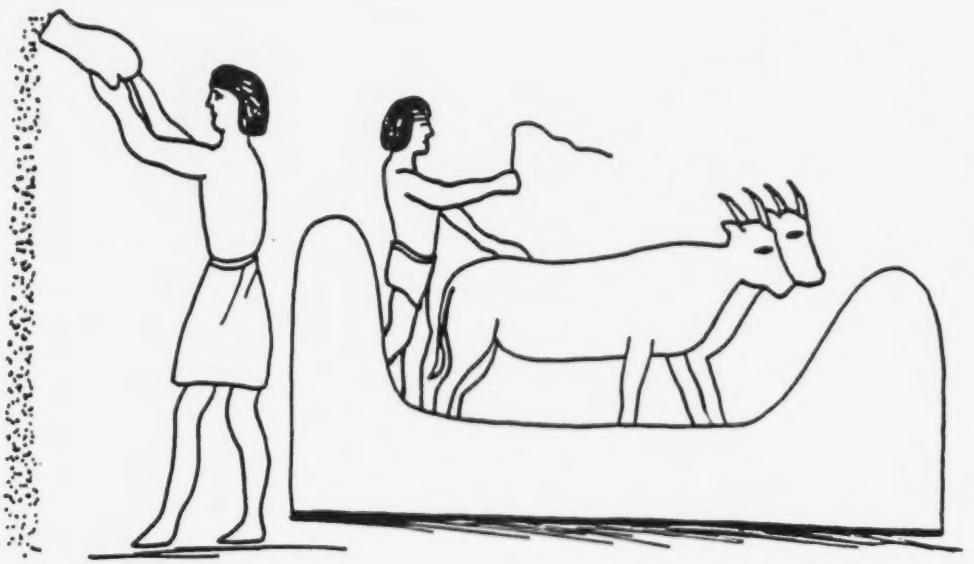


As the grain grew and ripened, birds and insects came to feed on it. Children were used to scare away the birds. Quite a lot of grain was lost before it could be harvested. Wheat was harvested by the Egyptians using stone sickles to cut the wheat. Later, metal sickles were made. The grain was cut off on its stem and gathered into bundles.



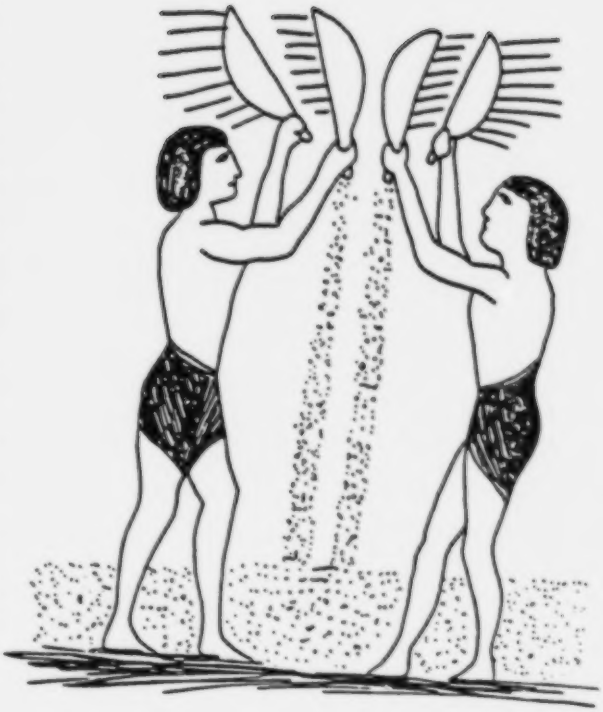
The bundles were tied up and carried from the field to the threshing area.

The wheat seed is at the top of the grain in the head. Each seed is found inside of a hard shell. This shell is a hull. To separate the seed, it has to be threshed or pounded out. The early Egyptians pounded the grain out by hand.



They soon learned an easier way. If the oxen walked on the grain it would break down the hulls. This type of threshing grain was done by walking cattle or oxen around in circles over the grain. The stems were taken away (this is called straw). The grain and hulls were still mixed together. They now had to be separated. How can the little hulls be taken away from the grain?

They found that the hulls were very light and would blow away. So the grain and hulls (called chaff) were tossed into the air. The hulls would blow away and the grain would fall downward into a pile. This was repeated until the grain was separated from the chaff. Separating the chaff from the grain was called "winnowing". The grain was then stored in baskets. The Egyptians had huge grainaries where they could store enough wheat to last for years.



The wheat was ground into flour on a saddlestone. This was a worn down flat stone. Another stone was rubbed over the wheat on top of it to crush the wheat into flour. Then they mixed the flour with a liquid which had natural yeast.

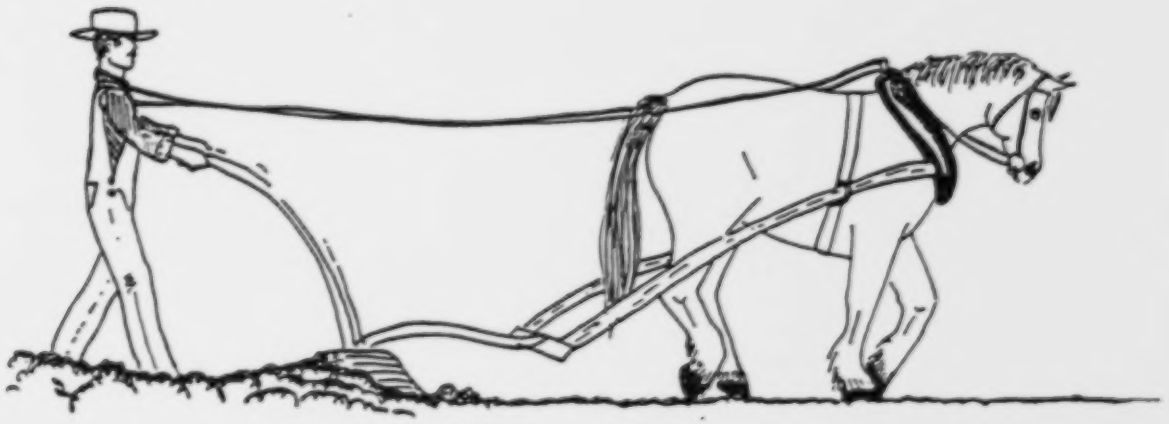
They would bake loaves of many shapes, sizes and types of leavened bread. Leavened bread is raised bread.

The Egyptians had many slaves to do all of this labor. But fewer people needed to spend all of their time working in the fields. The Egyptians had more people free to be scholars, teachers, religious leaders, artists, traders, doctors and shopkeepers. Their civilization was more complex because people were free to explore science, art, mathematics, medicine, and building.

Europe

The world produced wheat in this fashion for centuries. Europe in the 1500's was growing grain in the same way as early Egypt had.

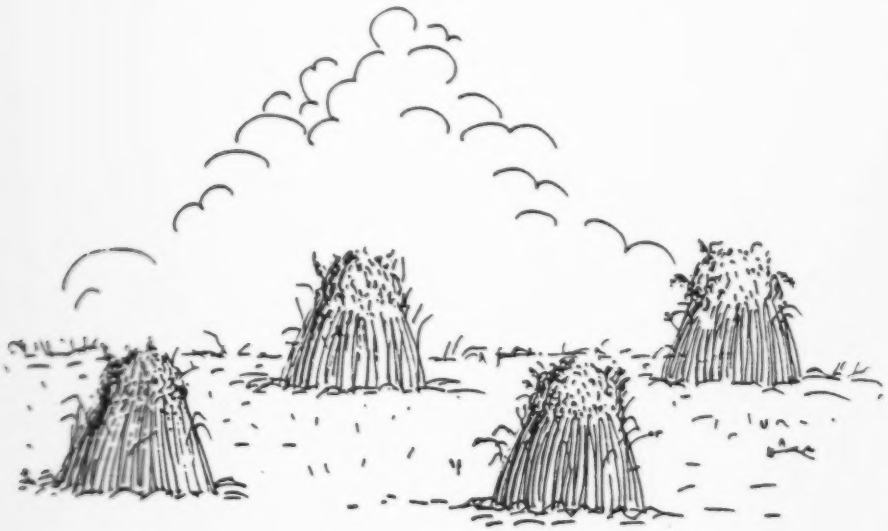
The plow was pulled by oxen or horses. It was wooden. A large bush was dragged over the field to break the soil up further.



Seed was broadcast across the field.

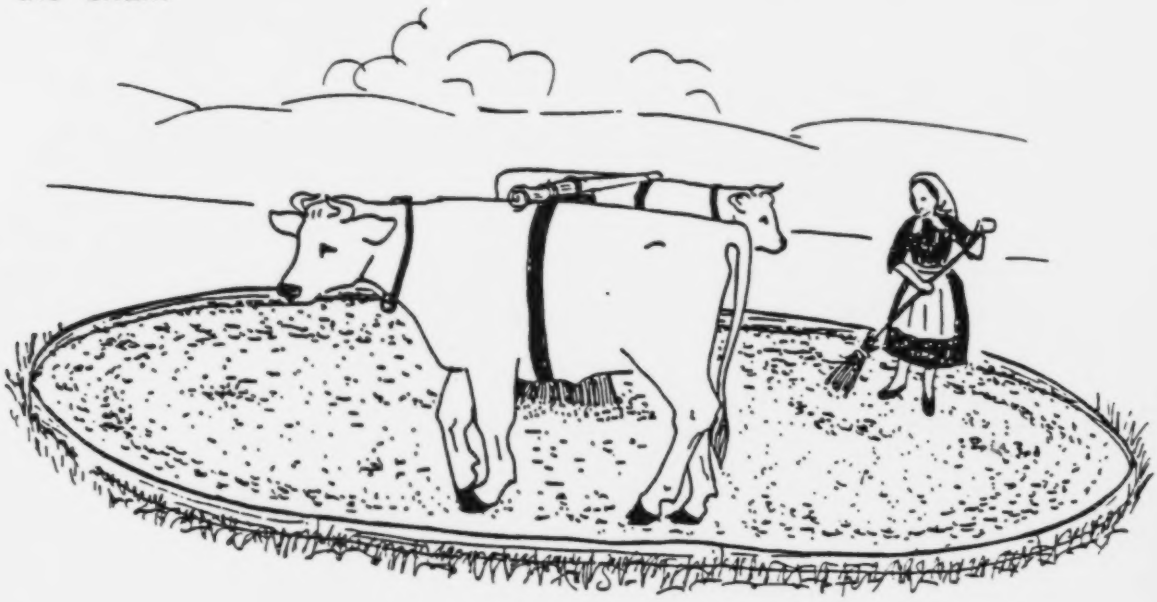
When the wheat was ripe it was cut off with a sickle or a scythe.

The stalks of wheat were tied in bundles.

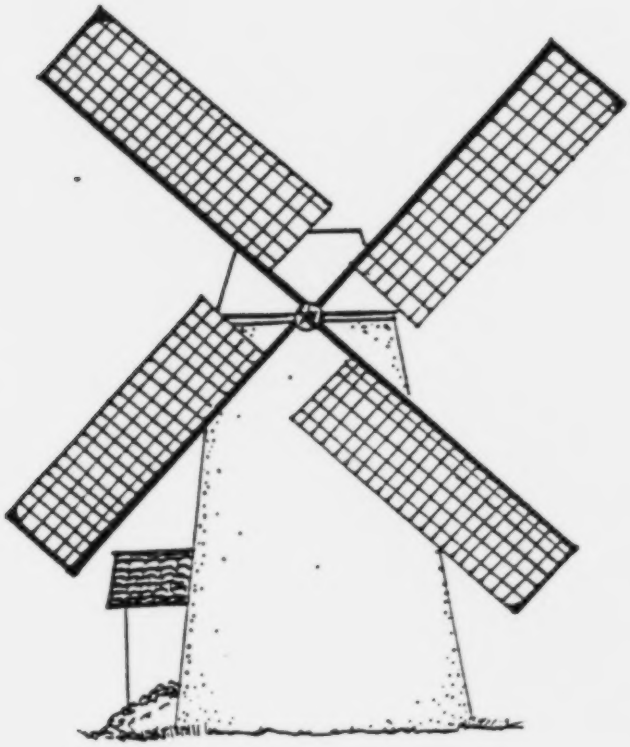


The grain was threshed off the stalk by either beating it by hand,

or having animals walk over it. The grain was then winnowed out using the wind to separate the grain from the chaff.



The one big change in Europe was in grinding grain. The windmill was invented to grind grain into flour.



The bread would then be baked into loaves either at home (most often) or at a bakery.

Vocabulary

Name_____Date_____

Define these words by looking them up in a dictionary.

Carriers-_____

_____

Sprinkling-_____

_____

Broadcasting-_____

_____

Sickles-_____

_____

Threshing-_____

_____

Hulls-_____

_____

Grain-_____

_____

Separated-_____

_____

Winnowing-_____

_____

Grainaries-_____

_____

Centuries-_____

_____

Scythe-_____

_____

Bundles-_____

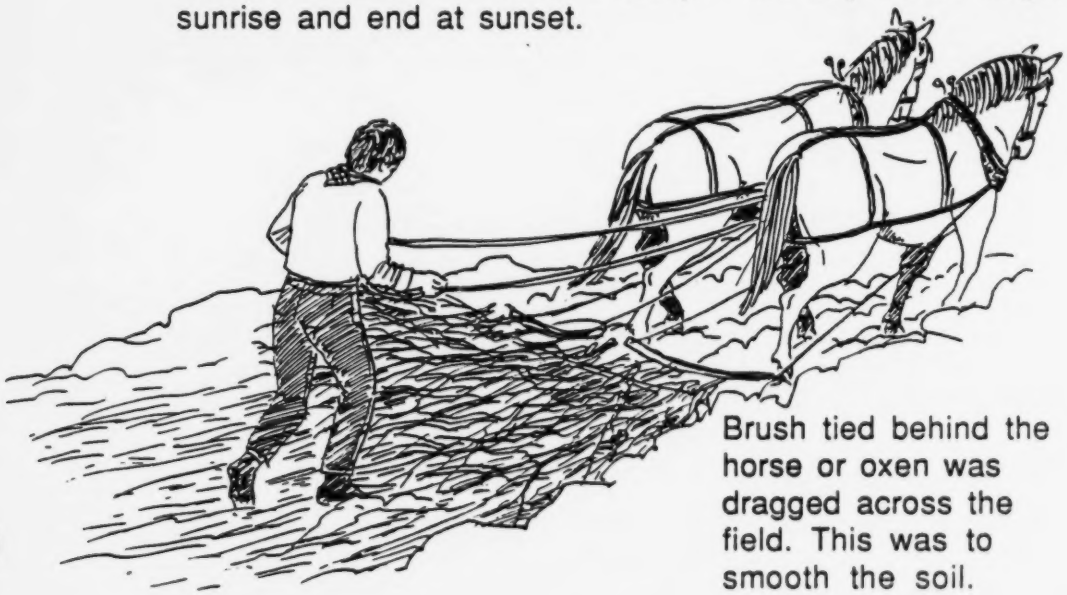
_____

Windmill-_____

_____

Colonists

Life was much the same when America was colonized. Plowing was done with a wooden plow and oxen or horses. The wooden plow only scratched the surface of the soil. A farmer could plow an acre of land in one day. (An acre is about the size of a football field). The day would begin at sunrise and end at sunset.



Brush tied behind the horse or oxen was dragged across the field. This was to smooth the soil.

Other farmers would hoe the field.

Then the seed was broadcast over the field to plant it. This was called sowing the seed. (Sowing sounds like "sewing".) To cover the seed, the brush was dragged over the field again.

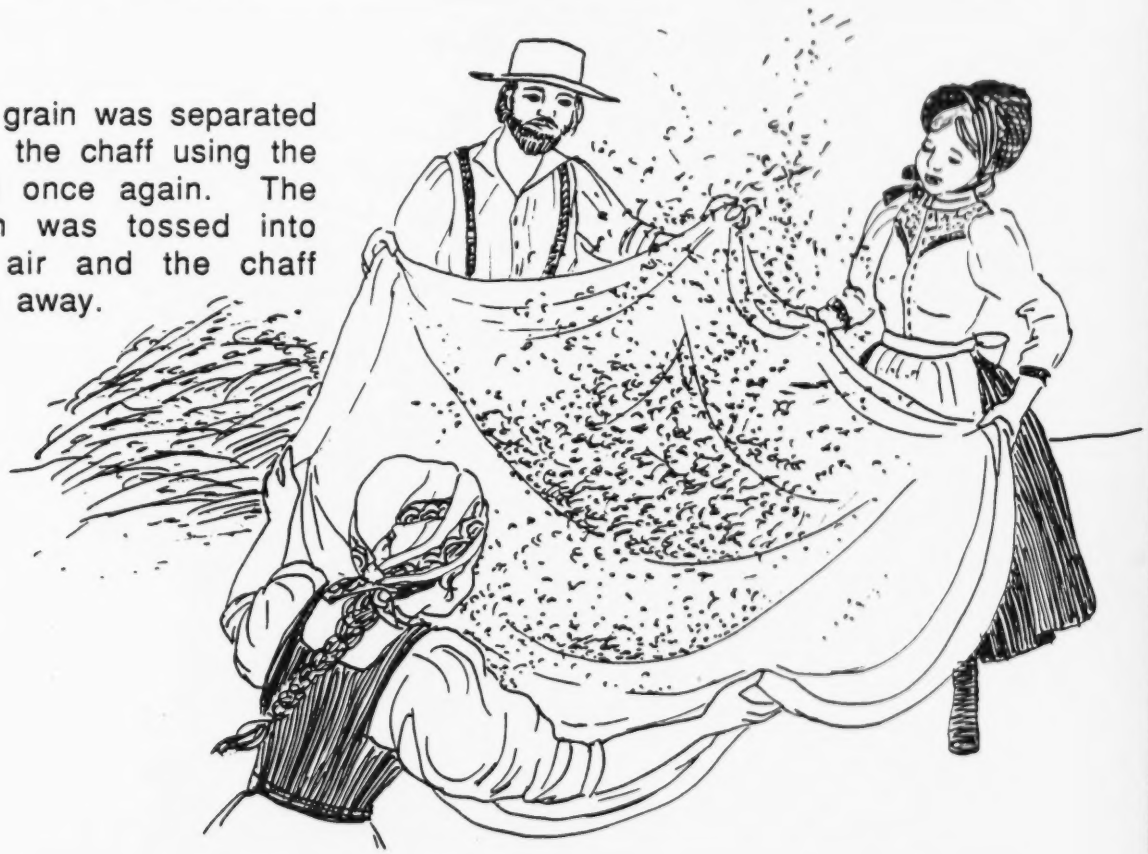
The ripe grain was cut off using a scythe or a cradle. A cradle had "fingers" to catch the stalks. Harvesting was easier with a scythe or a cradle than with a sickle.

Then the stalks of grain were gathered and tied in bundles. These bundles were known as sheaves. The sheaves would be stood on end to dry for a couple of days.

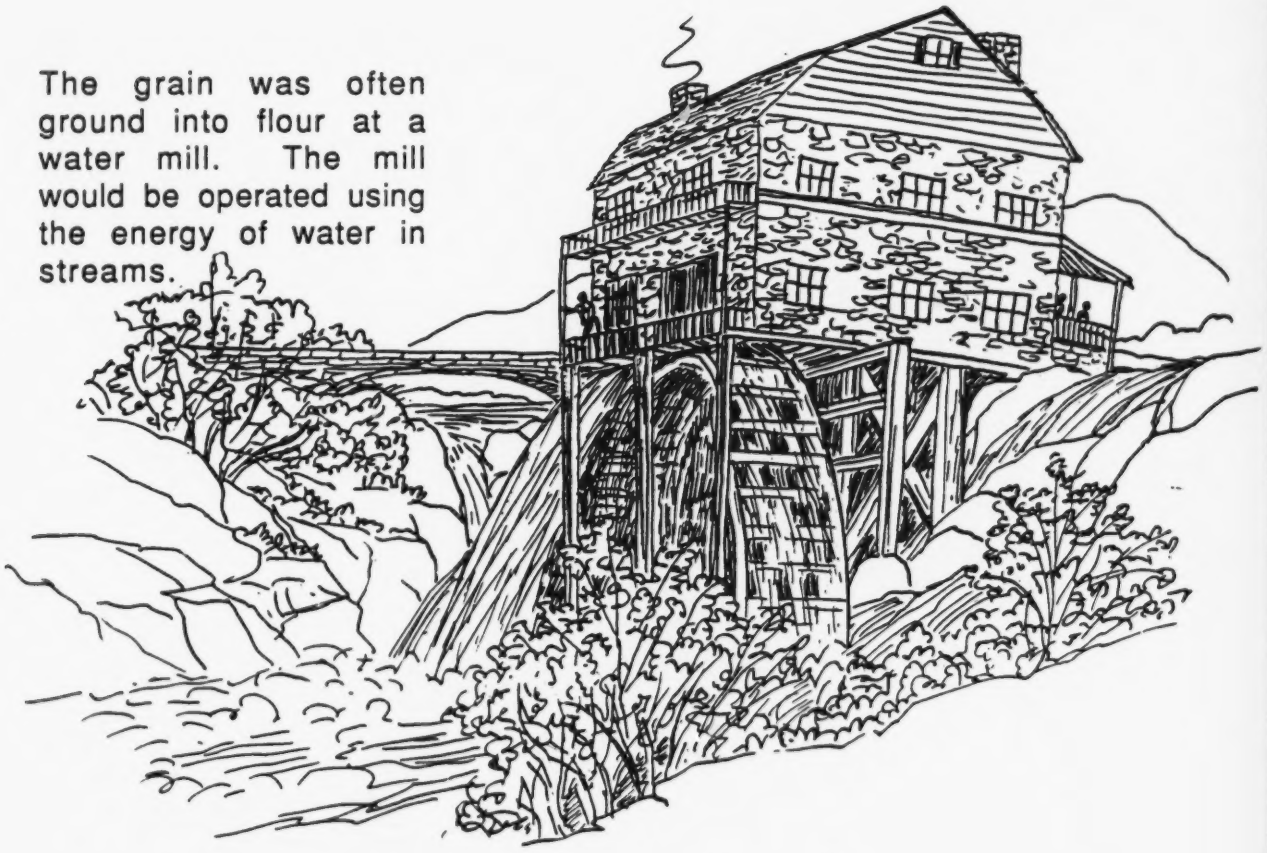
The grain was threshed by flailing it with leather connected to long handles. Using oxen or horses to trample it was also done. In a ten-hour day, a very hard worker could thresh 6 to 10 bushels of grain.

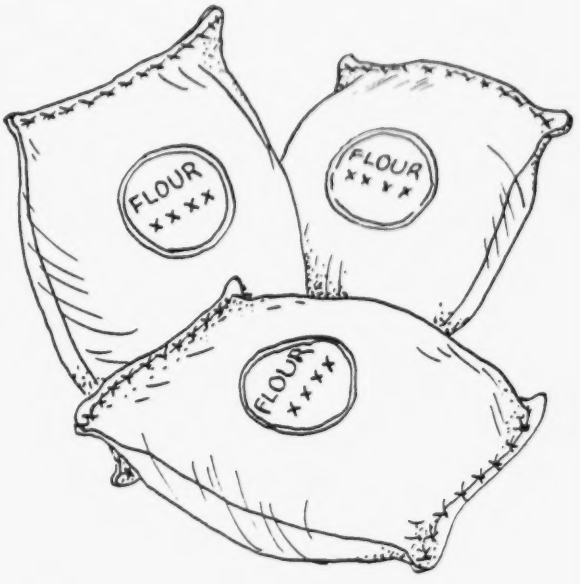
Or, the grain was trampled by oxen or horses.

The grain was separated from the chaff using the wind once again. The grain was tossed into the air and the chaff blew away.

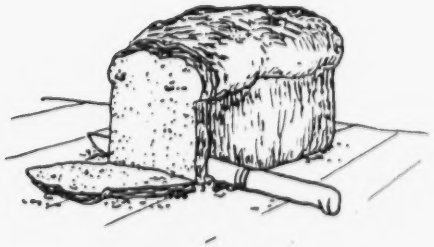


The grain was often ground into flour at a water mill. The mill would be operated using the energy of water in streams.





The flour was made into bread at home. Usually one day of the week was baking day.



The Steam Engine

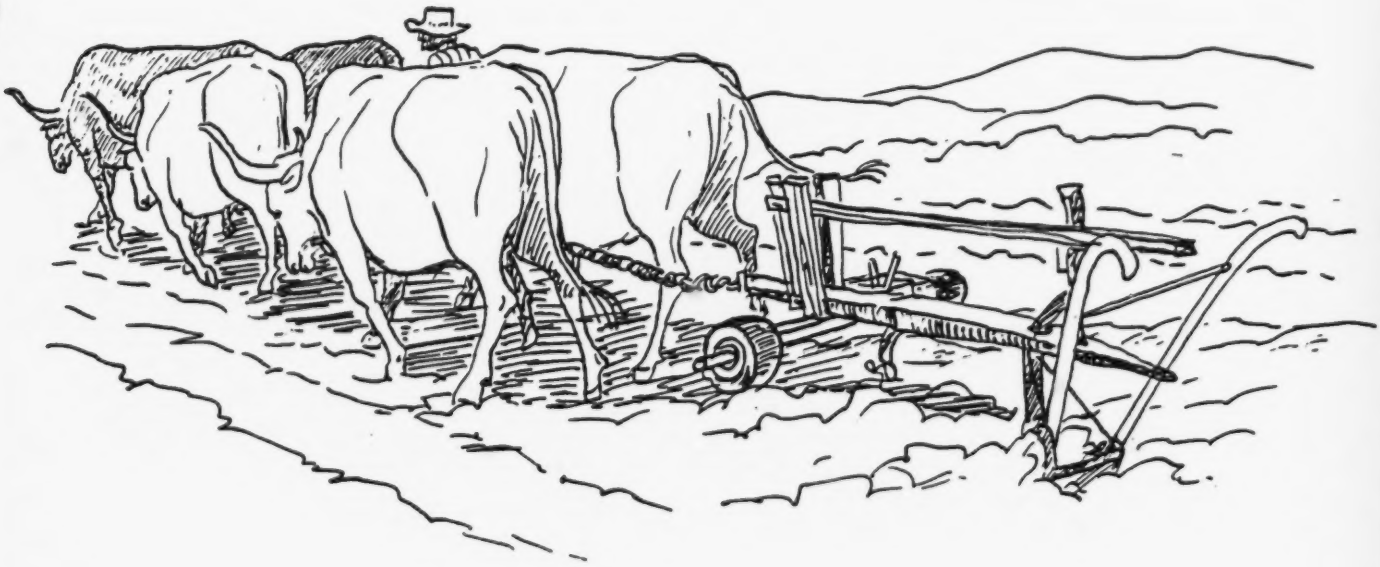
Huge changes began just about the time the steam engine was invented.

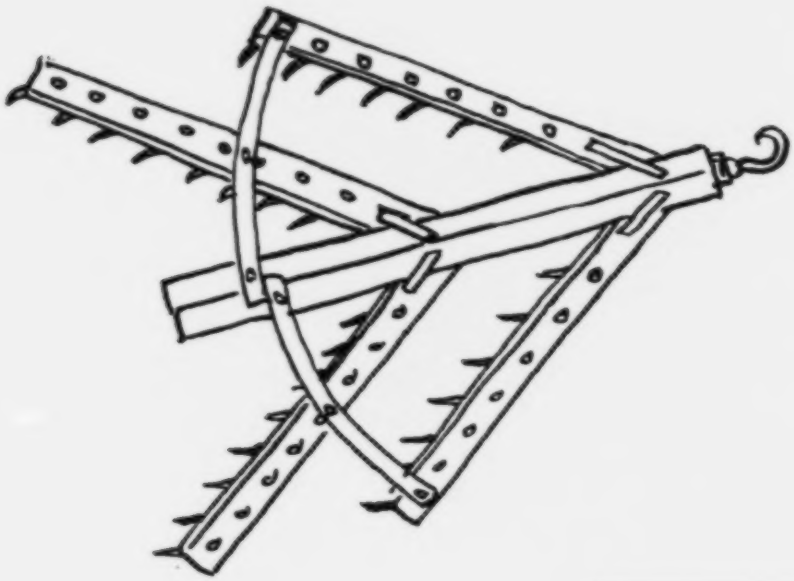
As you can see, progress was slow. For centuries wheat was produced the same way. Land was scarce. Labor was not. There was no need to change.

The new world had much land but little labor. After the American Revolution, an agricultural revolution began. Inventions and inventors were everywhere!

The first act of the first U.S. Congress was a patent law. Patents protect ideas of one inventor from being stolen by another. Farmers' inventions which were to make life easier became a business.

First, a cast iron plow and then a steel plow were invented. But plowing was still done with horses or oxen.

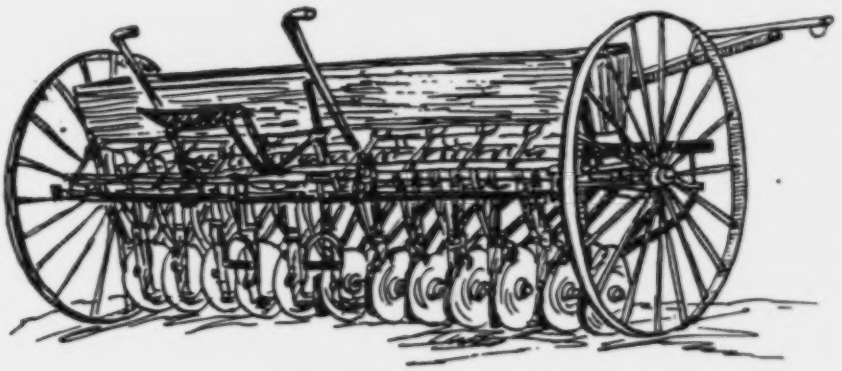




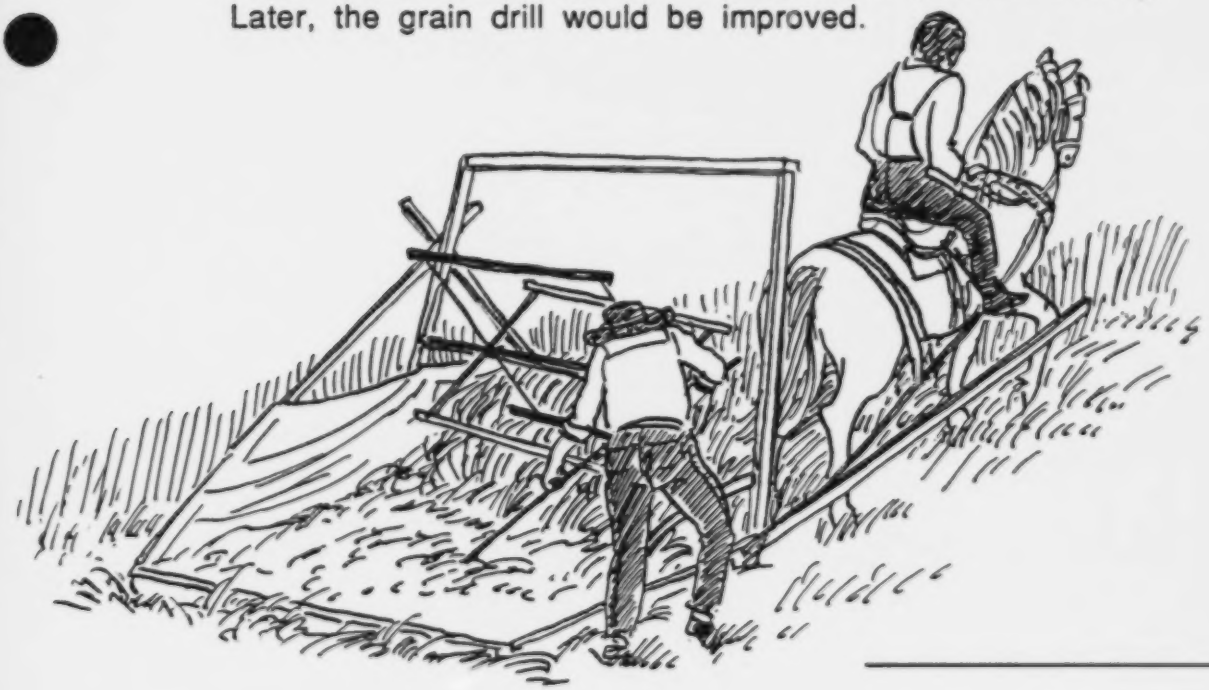
After plowing, the soil was worked up with a harrow. The harrow replaced the tree limb or brush for smoothing the soil.

The next step, seeding, was also improved. Little machines made broadcasting more even

and then seeders and grain drills were invented.



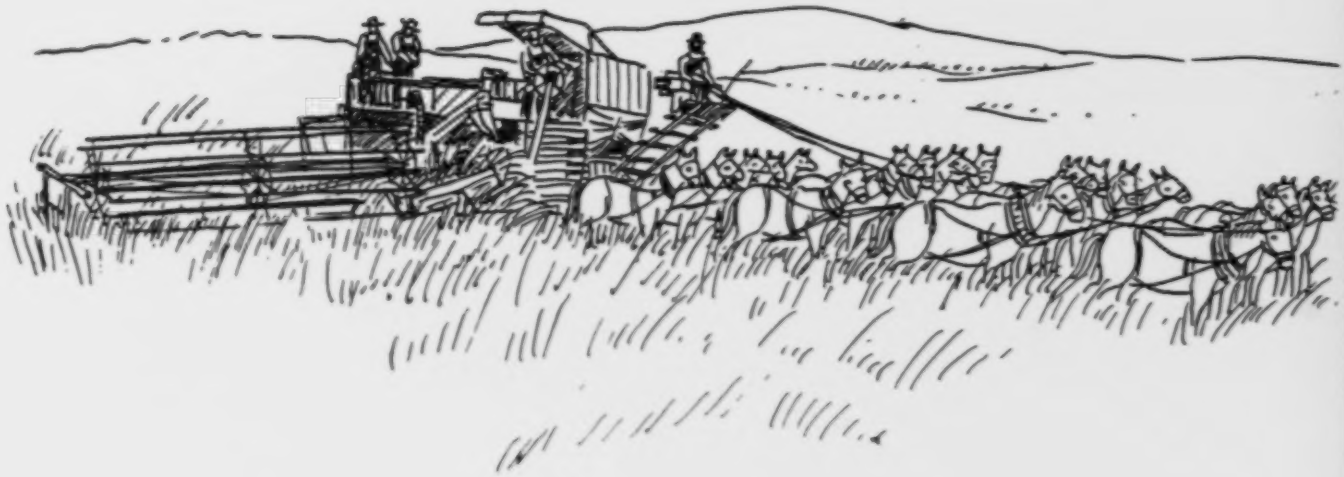
The grain drill planted seeds in the ground. Crops were much better when rows of seeds were planted evenly. Later, the grain drill would be improved.



Cutting grain became much easier after McCormick invented the reaper. The reaper cuts off the stalks of

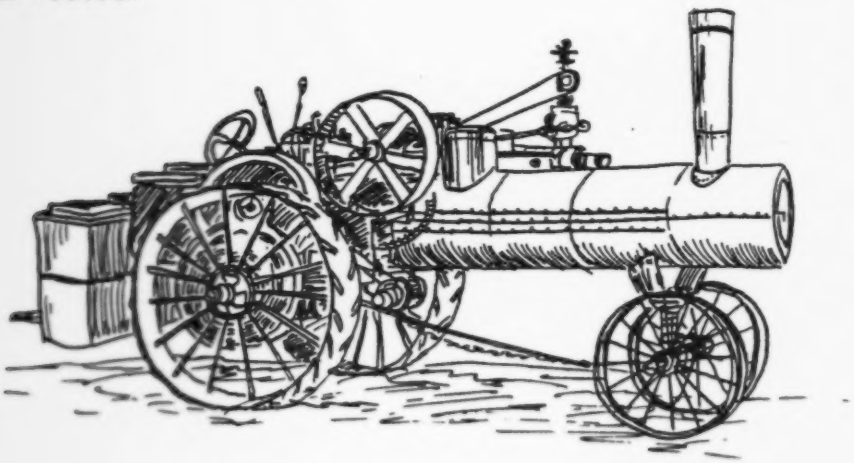
grain. A person raked off the stalks and then tied it into bundles. The reaper saved a lot of time and human work.

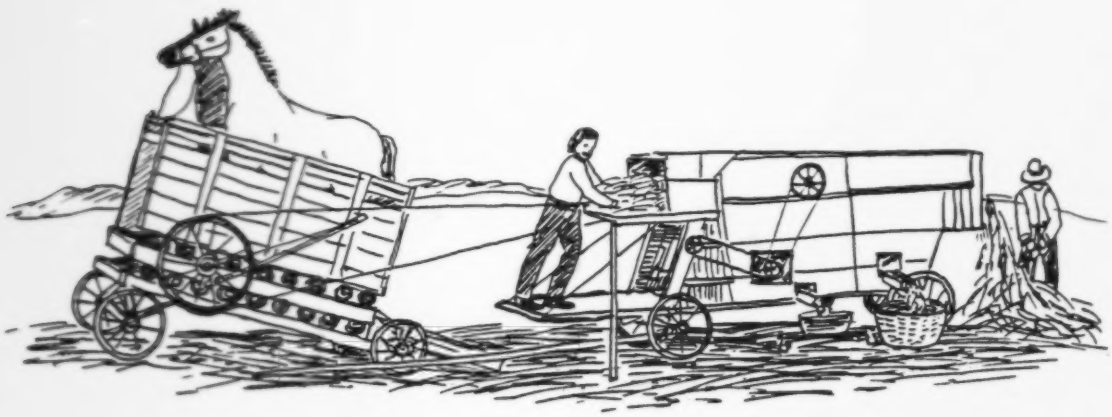
Once the McCormick Reaper became common, many new machines were invented or improvements made on old ones.



Soon, reapers hitched to twenty or more horses or mules were common in the Great Plains. But there is a limit to how many horses can be used at once. It would take many men hours and hours to hitch up all of the horses needed to pull a large reaper. A better source of power was needed.

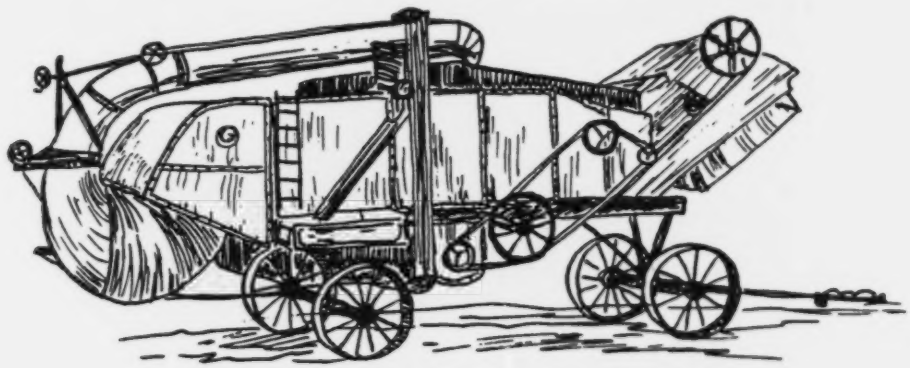
A practical engine was made at the end of the 1700's. But it did not move. It worked in one place. Moving steam tractors came almost a century later in the late 1880's. The first use of the steam engine was after the grain was harvested.



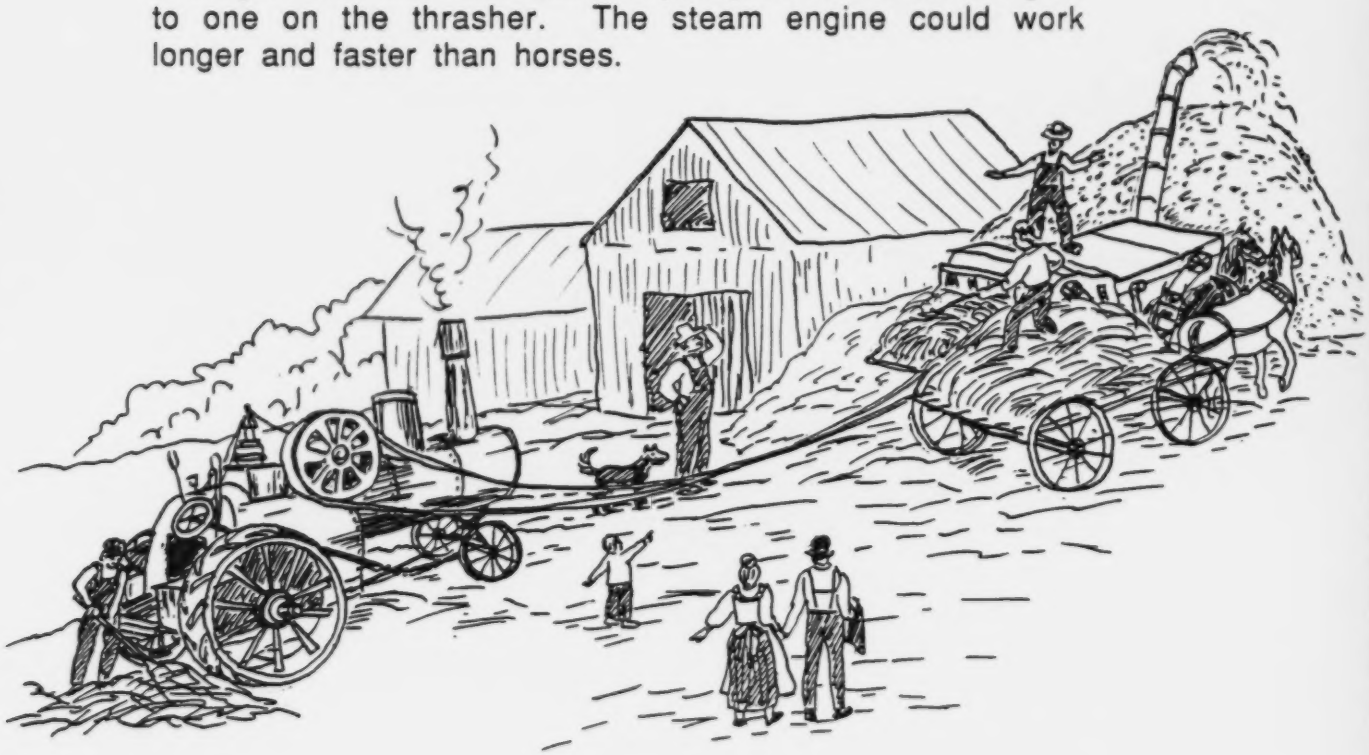


When the thrasher was invented, it was horse-powered. Horses walked on a belted platform that turned a pulley. The pulley was attached to the thrasher.

The steam engine's first use was to power the thrasher.

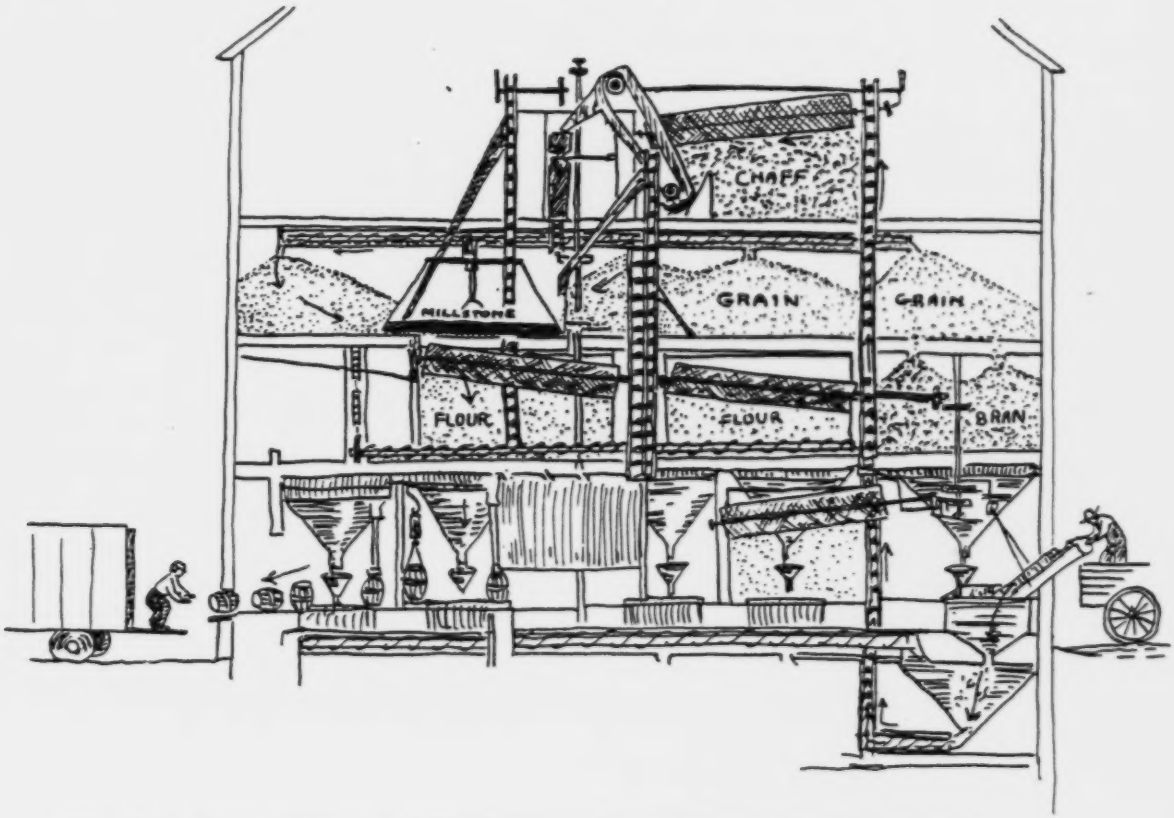


A long leather belt connected a pulley on the steam engine to one on the thrasher. The steam engine could work longer and faster than horses.



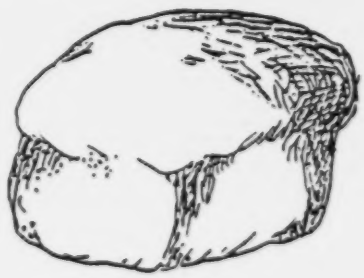
But the bundles of grain were carried to the thrasher. Teams of thrashers traveled the country helping with the harvest.

Grinding grain into flour was also done by steam power at this time.



Soon steam engines would be made into tractors. These tractors would plow the soil and provide power for the whole farm.

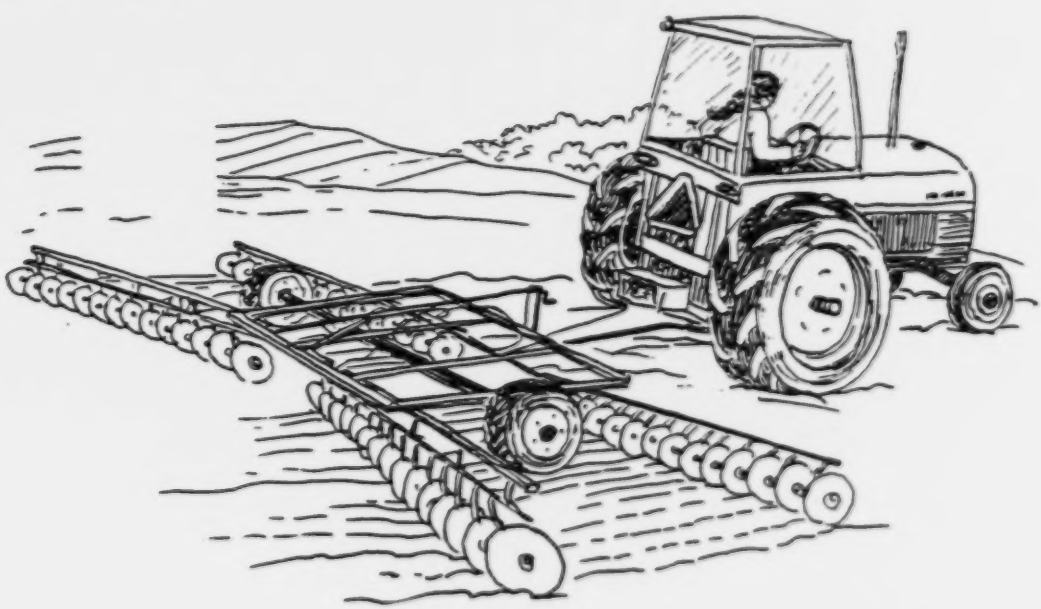
From Egypt through the 19th century most bread was baked at home.



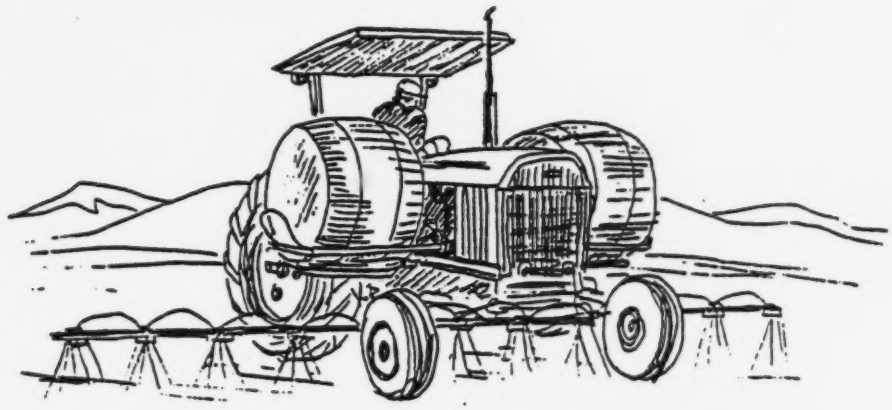
TODAY

Today, growing, harvesting, milling and baking are all done with machines. Large tractors are used to plow the fields.

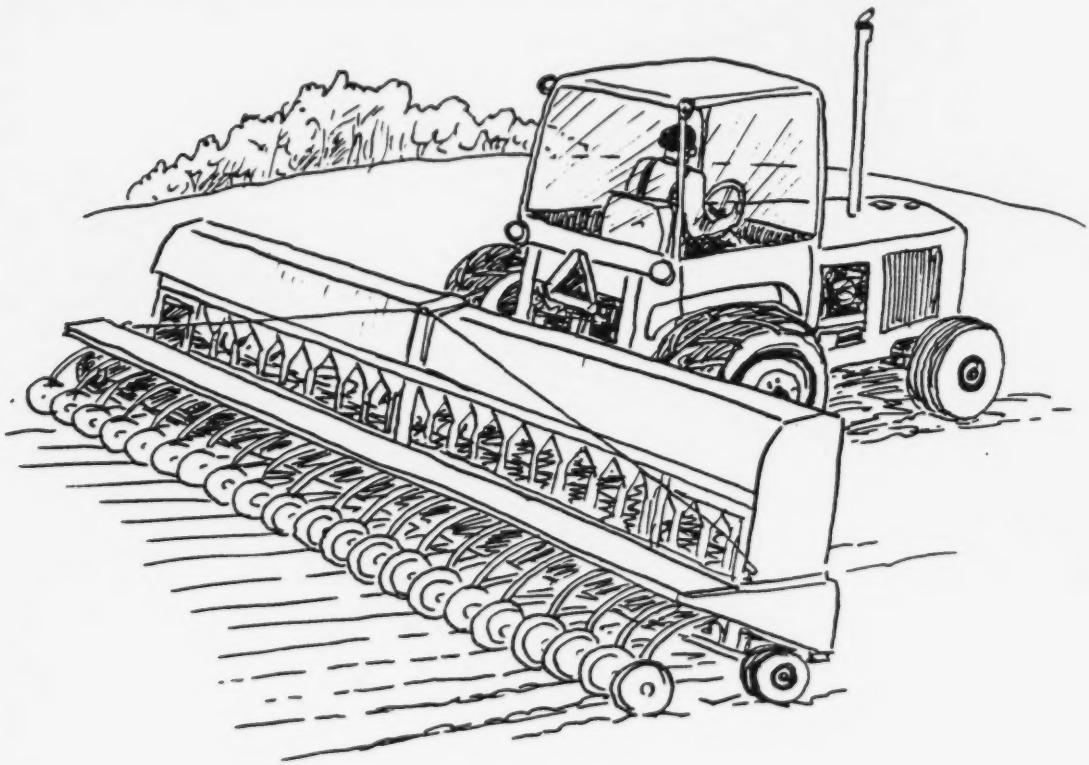
Plows are followed by discs and harrows. The soil is worked finely.



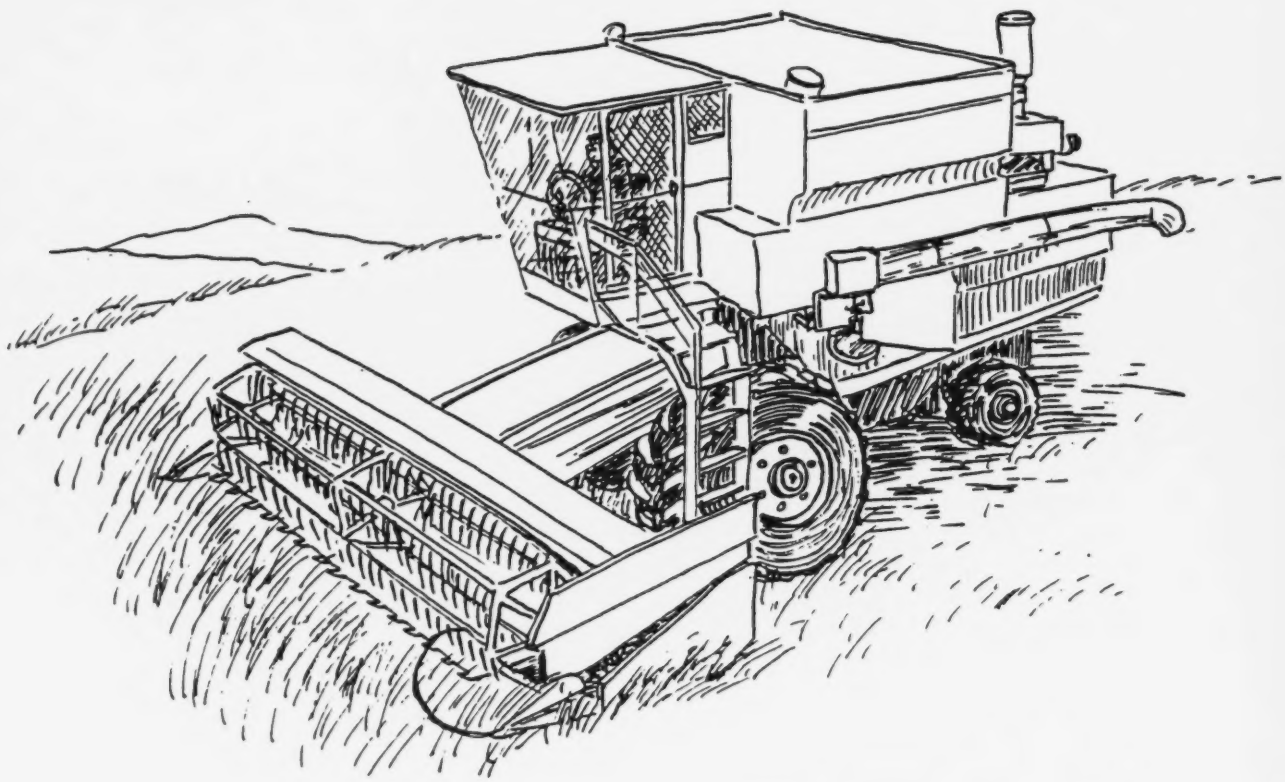
Chemicals kill insects and weeds. Fertilizer is added at the right time and place.



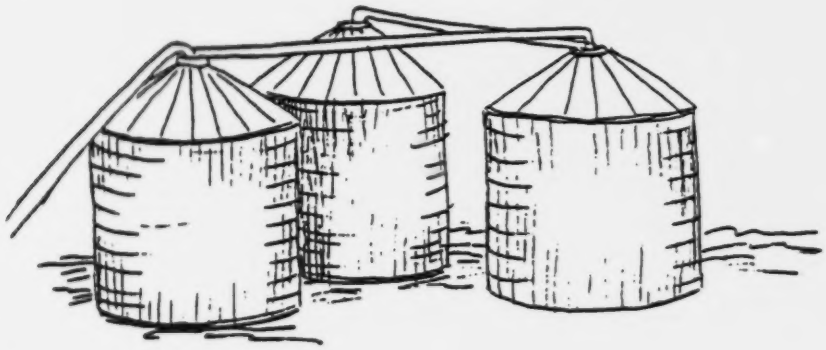
Grain drills plant many rows of seed. Seed is planted at the right depth. Seed types are bred and chosen carefully.



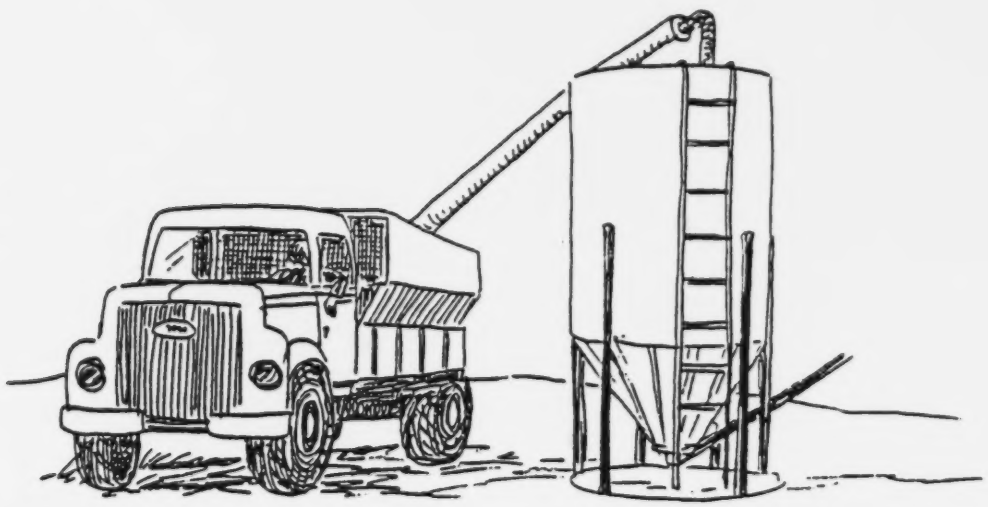
Wheat is harvested with a combine. This machine cuts the wheat, removes the grain from its hulls and separates the grain from the chaff.

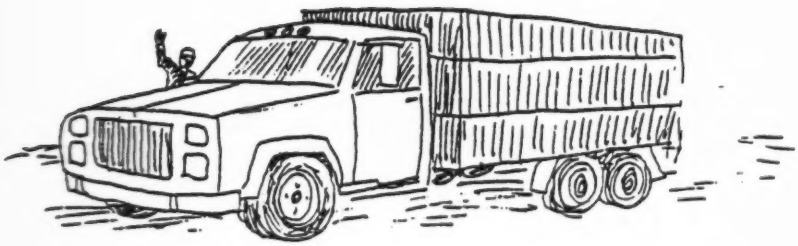


Grain is stored in large bins on the farm.



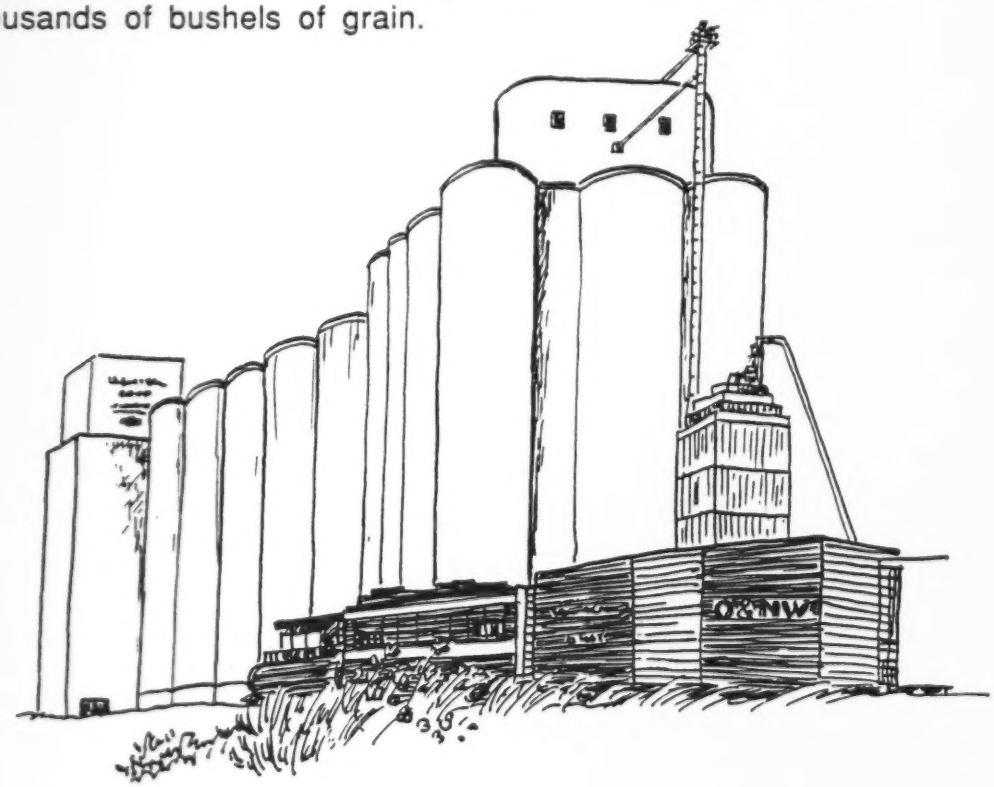
If the grain is used to feed livestock, it will be ground into feed at the farm and mixed with other grains.



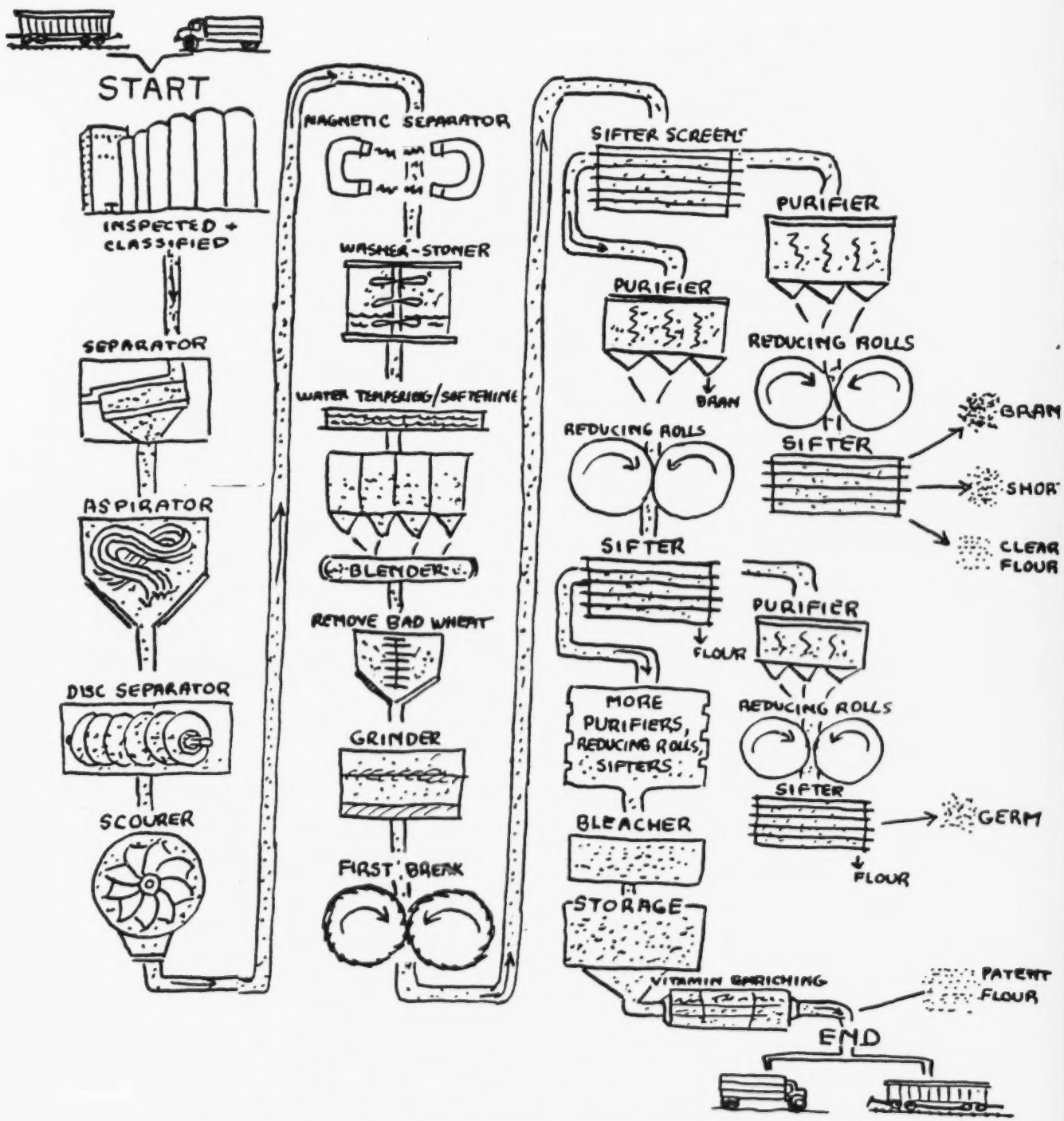


If the farmer decides to sell it, he trucks the grain to the grain elevators or to a mill.

Grain elevators are tall cylinders which can hold thousands of bushels of grain.

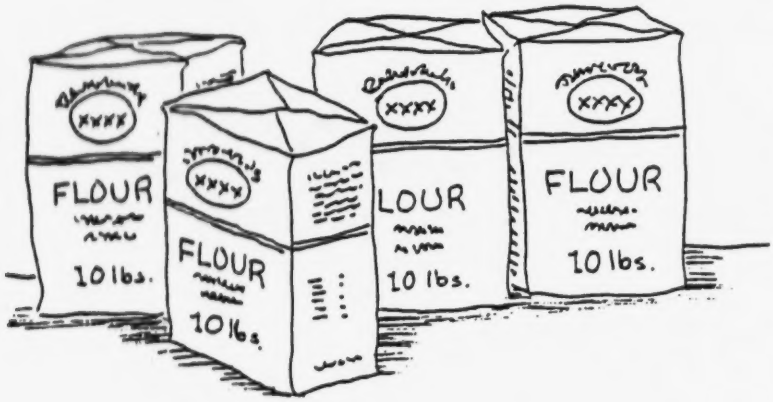


From the elevator, grain is loaded onto railroad cars or ships and sold to other countries. It is also ground into flour.

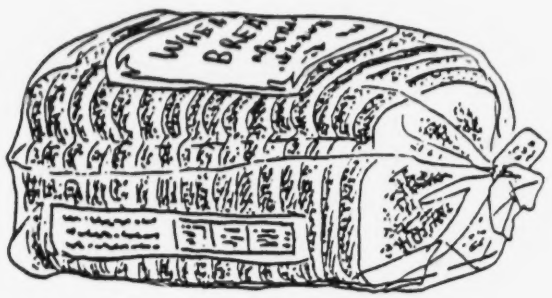


A modern mill is very complex.

Flour is sold to stores or bakeries. Flour is sold in many forms; cake mixes, noodles, cookie mixes, and other products.



Bakeries bake flour into bread and many other foods. The bread is sliced, wrapped and sold to stores and restaurants.



Very few people produce grain today in the United States. Food is cheaper than anywhere else in the world. This allows the rest of the U.S. to hold many different types of jobs and spend money on luxuries such as cars and televisions.

Vocabulary

Name_____Date_____

Define the following words by looking them up in a dictionary.

Harvesting-_____

_____

Acre-_____

_____

Hoe-_____

_____

Cradle-_____

_____

Sheaves-_____

_____

Flailing-_____

_____

Invent-_____

_____

Progress-_____

_____

Centuries-_____

_____

Revolution-_____

_____

Patent-_____

_____

Steam engine-_____

_____

Machines-_____

_____

Grain drill-_____

_____

Bred-_____

_____

Combine-_____

_____

Complex-_____

_____

Elevator-_____

_____

Bakeries-_____

_____

Luxuries-_____

_____

Vocabulary

Name_____Date_____

Find these words of Foods made from Wheat:

SPAGHETTI
PIE
PASTRY
ROLLS
HOT DOG ROLLS
CRACKERS
CEREAL
NOODLES
BUNS
WAFFLES
BROWNIES
LASAGNA
CAKE

S P A G H E T T I C Z

C P I E O R S W L R R

W A N E T K E B X A C

A S K C D E L J A C O

F T R E O M D D S K A

F R H C G A O V B E N

L Y L E R W O U F R G

E I B R O W N I E S A

S T J E L S P X C A S

I F K A L N R L D K A

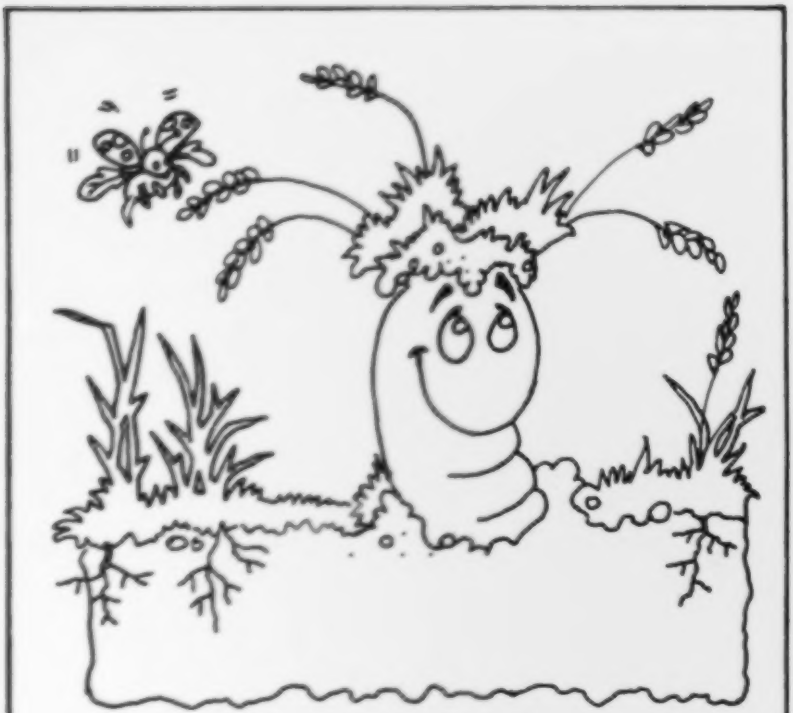
R O L L S T J W M S L

sammy

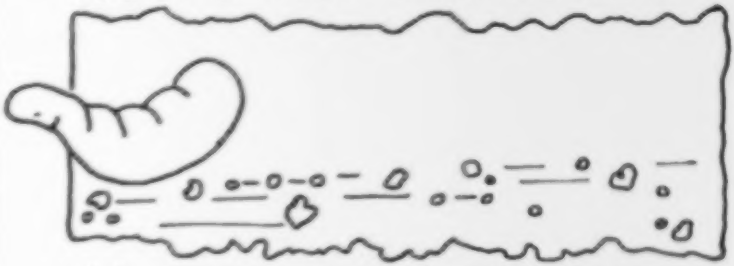
soil saver

This coloring book
belongs to:

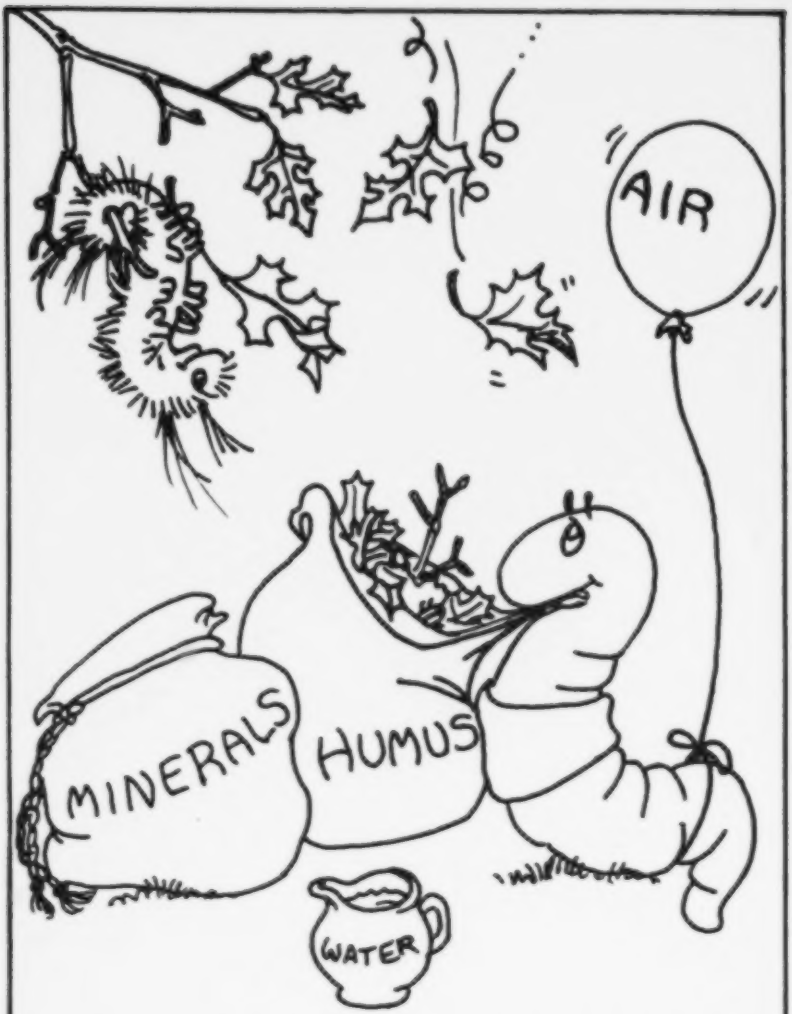
_____



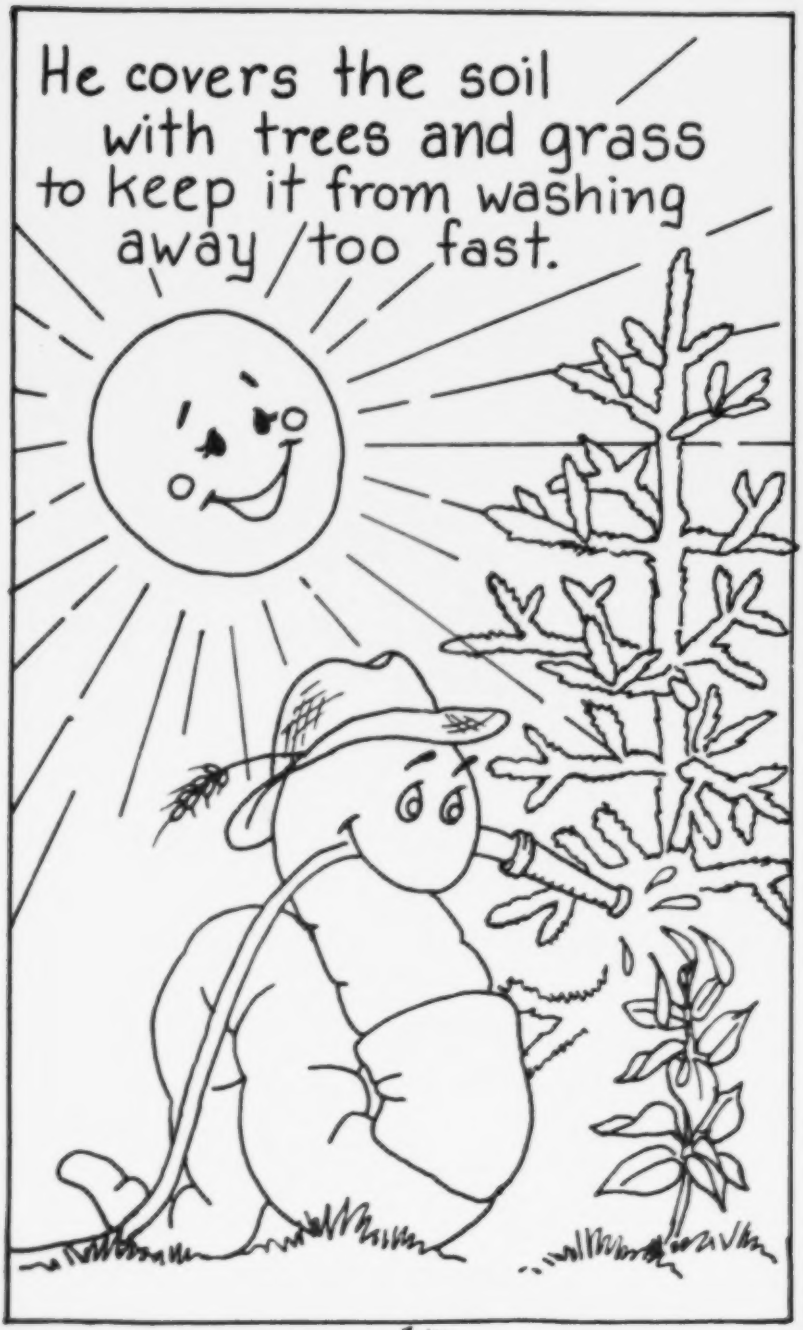
Meet Sammy earthworm.
He's a real soil saver.

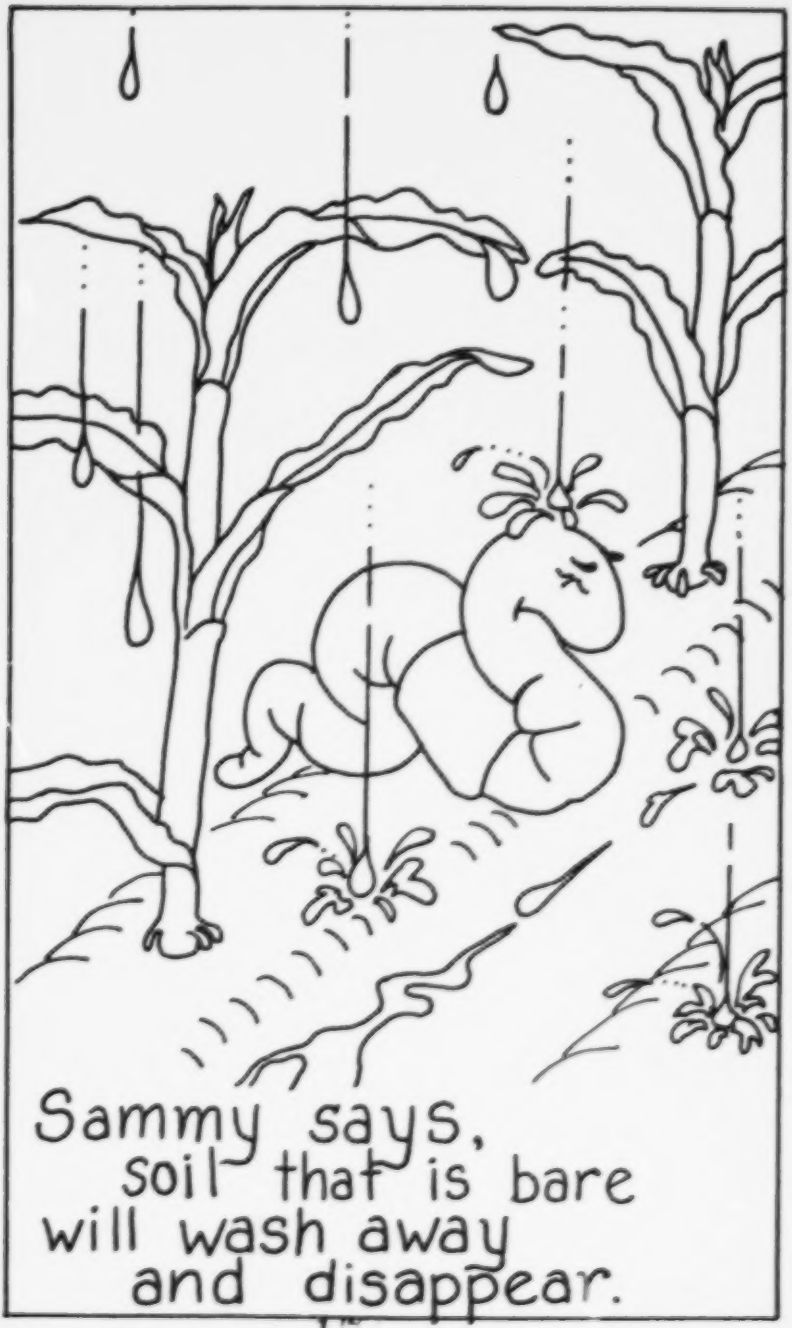


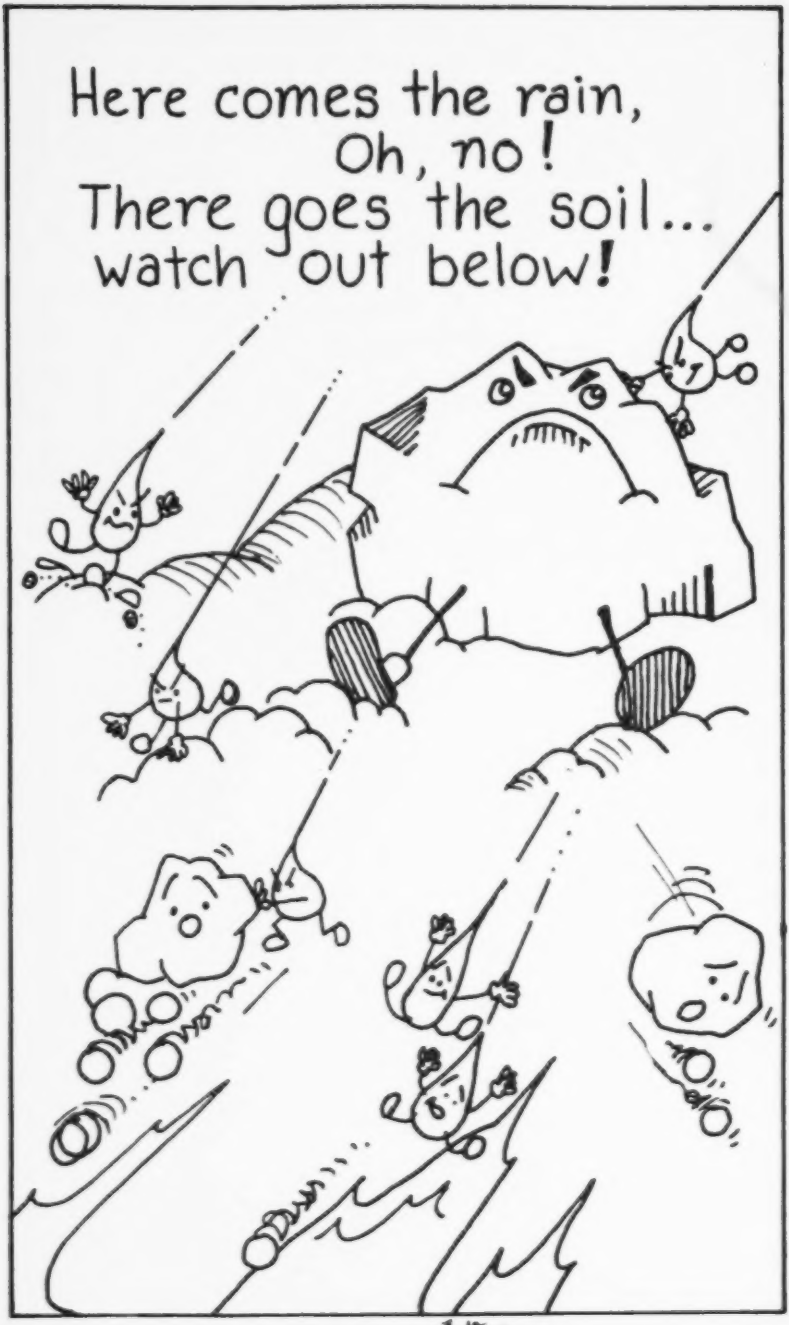
He wants to tell you a
story and ask for
a favor . . .



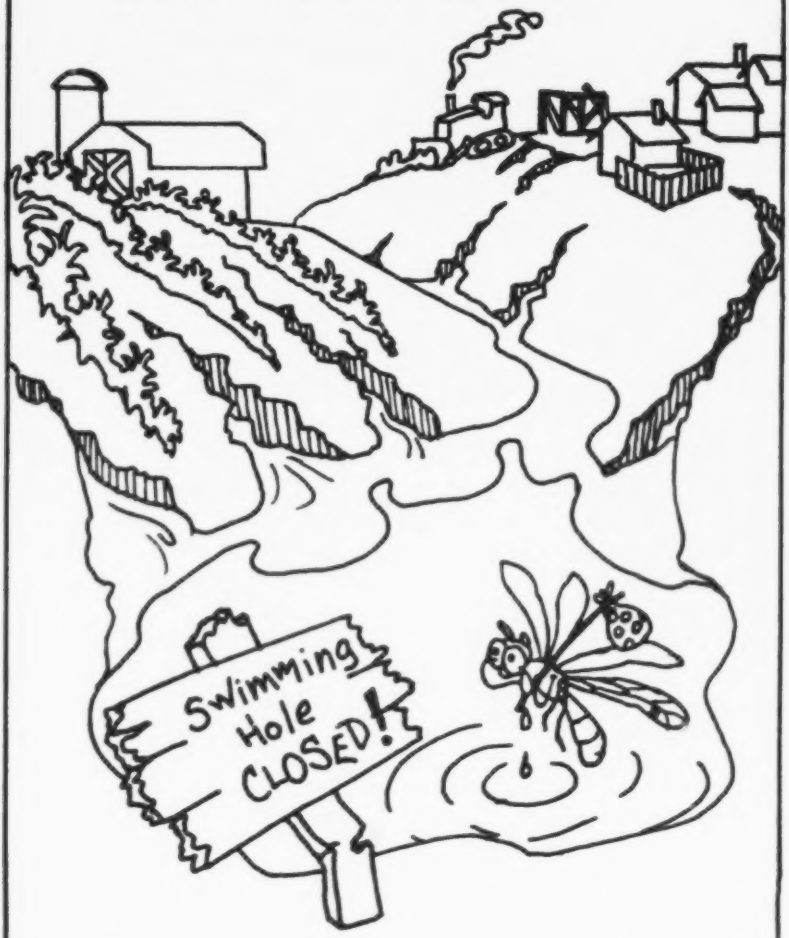
While others save bubblegum
wrappers and foil,
Not Sammy the Earthworm,
he saves soil.

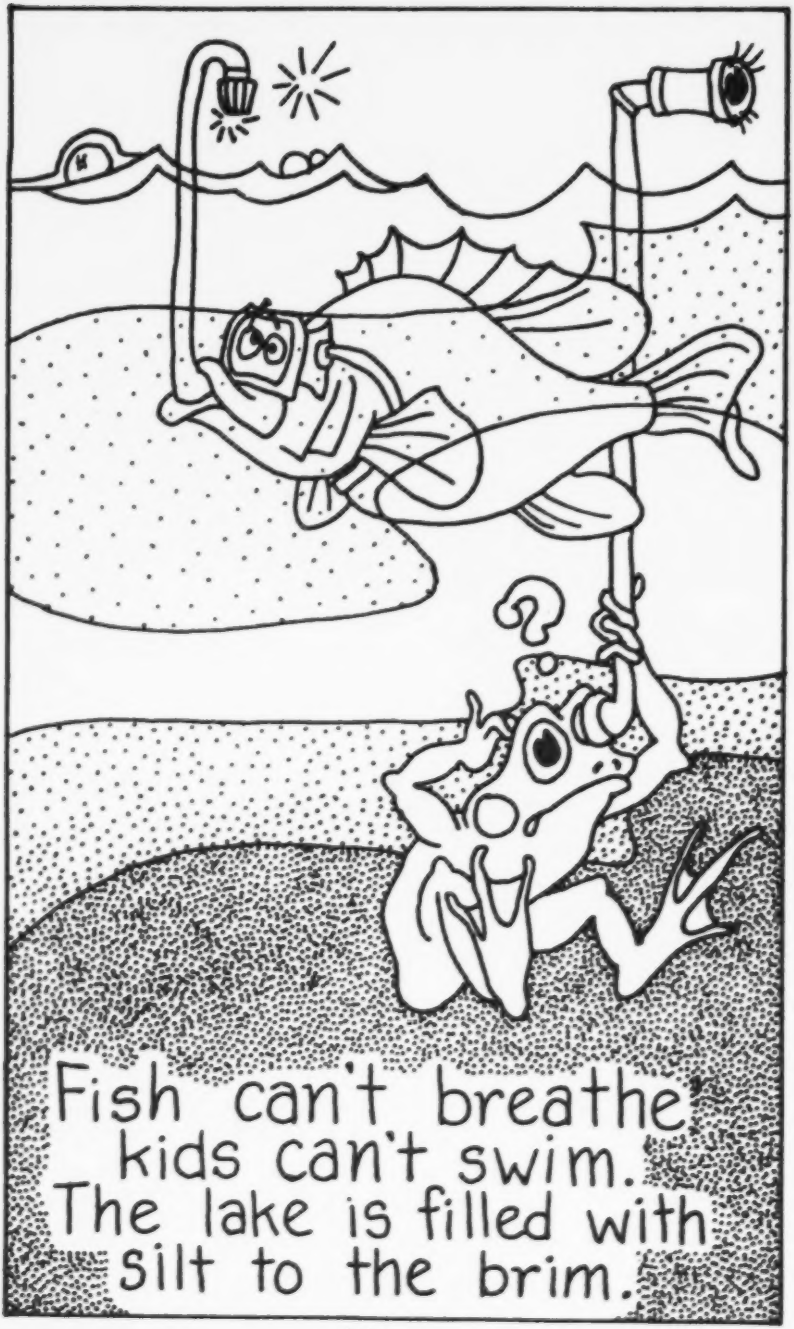

He covers the soil
with trees and grass
to keep it from washing
away too fast.

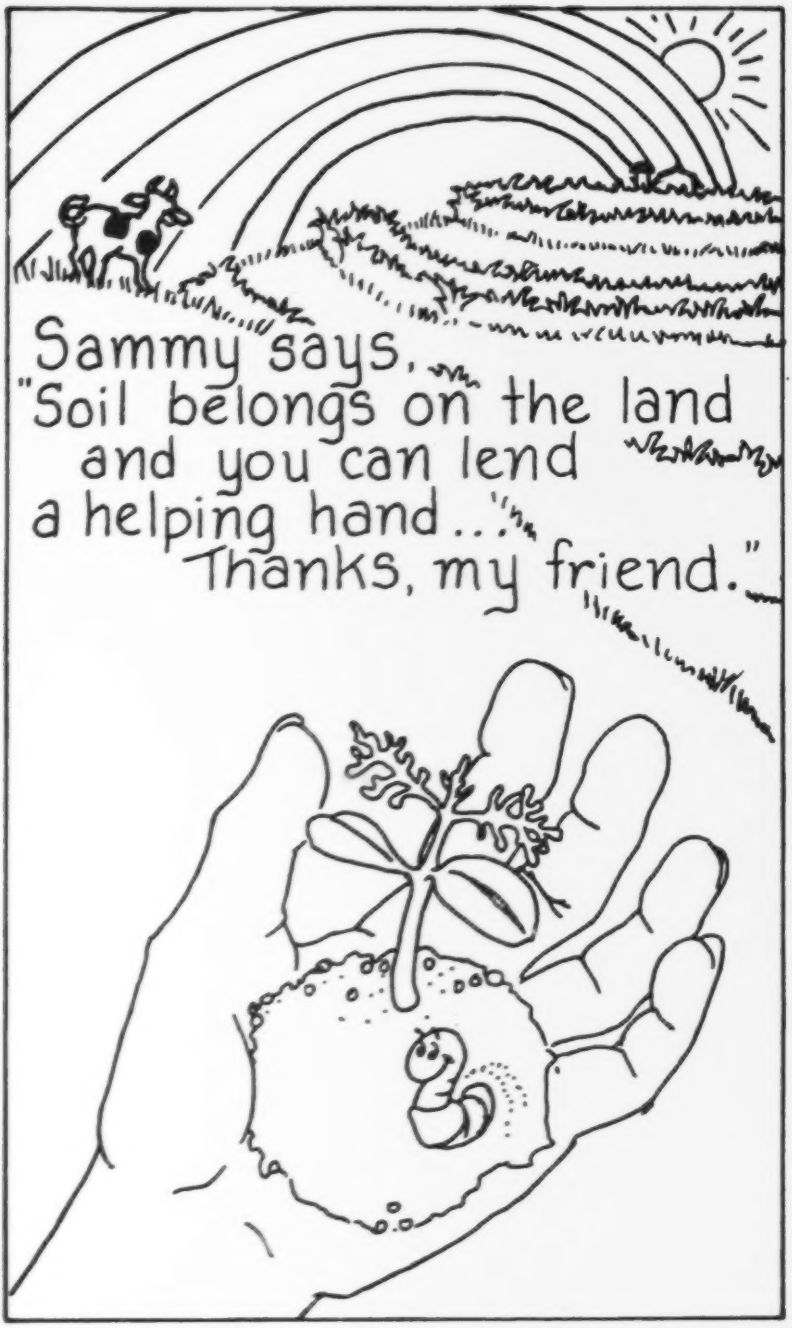

Sammy says,
soil that is bare
will wash away
and disappear.


Here comes the rain,
Oh, no!
There goes the soil...
watch out below!

Down the hill
Into the lake;
making clean water dirty.
What a mistake!




Fish can't breathe
kids can't swim.
The lake is filled with
silt to the brim.


Sammy says,
"Soil belongs on the land
and you can lend
a helping hand...
Thanks, my friend."

Glossary

clean water: water which looks clear.

conservation: wise use of soil & water; being careful not to waste it.

earthworm: an animal that lives under ground, eats dead plants and loosens soil.

erosion: washing or blowing away soil by water or wind.

grass: a plant used to hold soil in place and to feed animals.

lake: large area of deep water where plants, animals and fish live.

silt: tiny pieces of soil that are smaller than grains of sand.

soil: a thin layer covering the earth; a mixture of minerals, air, water, and bits of plants and animals.

(NEW WORDS: _____
_____)

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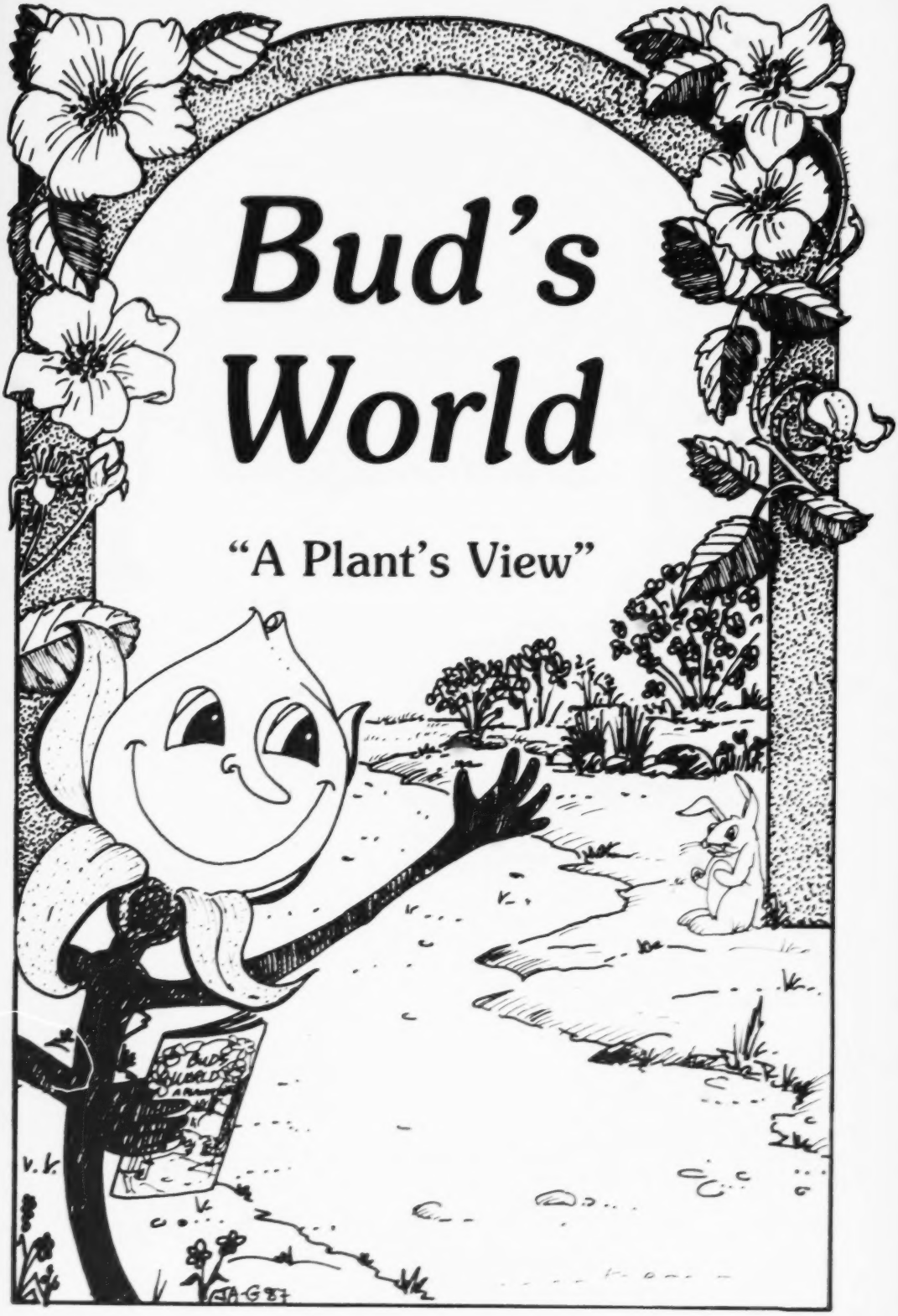
Illustrated by Laura Jaimes


Bud's World
"A Plant's View"

BUD'S WORLD
A Plant's View

Written by- Betty Wolanyk
Extension Associate
Department of Education
Cornell University

Illustrated by- Jethro Abplanalp-Gaede
Graphics by- Catharpin Studio

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1987

Hello! Welcome to my world!
I'm pleased to meet you. My name is Bud. I am a rose.
It is nice of you to join me today! I would like to show you my world. It's your world too!
Are you ready? Let's go!

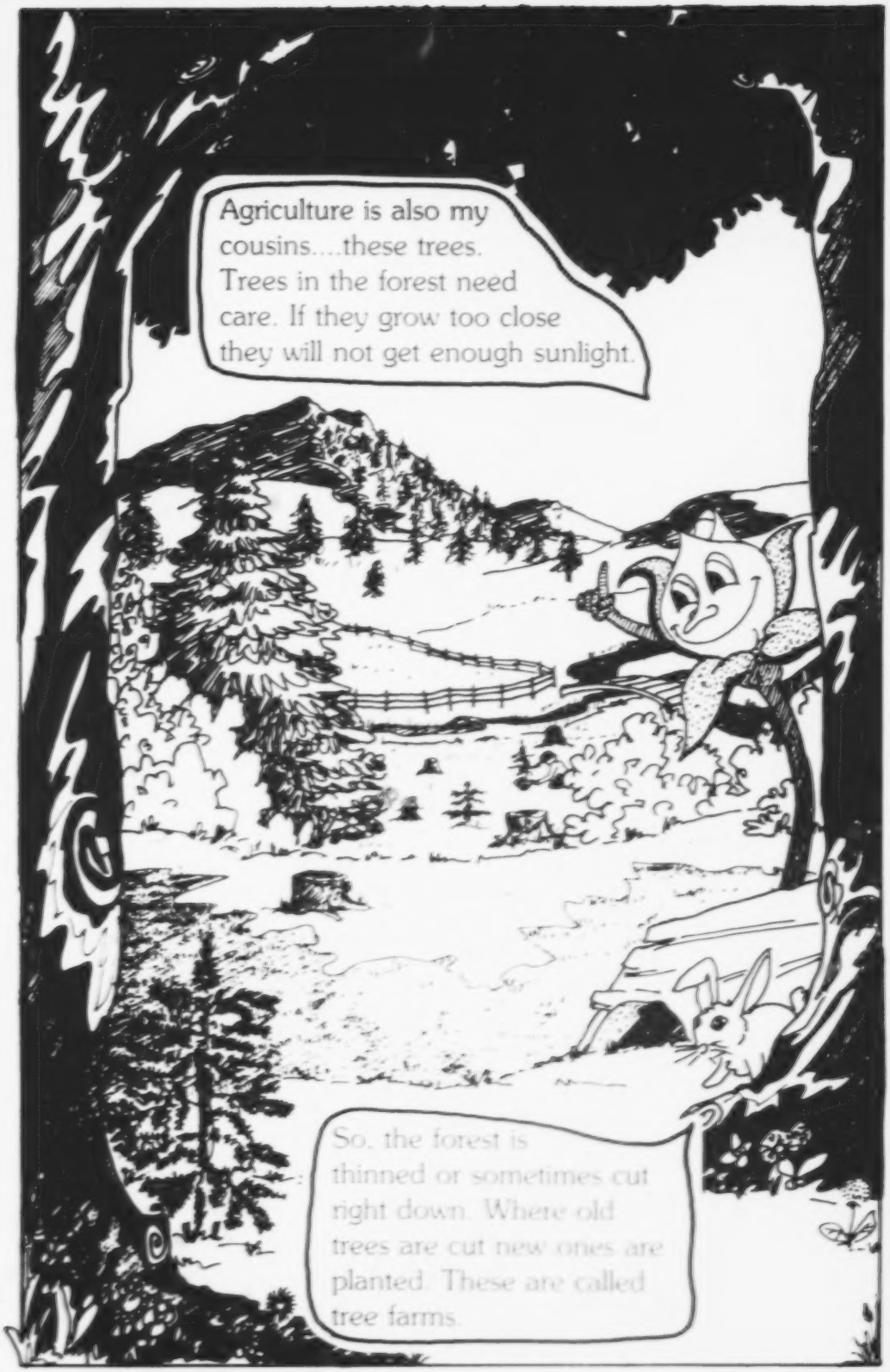
Agriculture

People think of agriculture as this:
A small farm: a few cows, a couple of pigs and some chickens scratching in the dirt. Farming as it was fifty years ago!

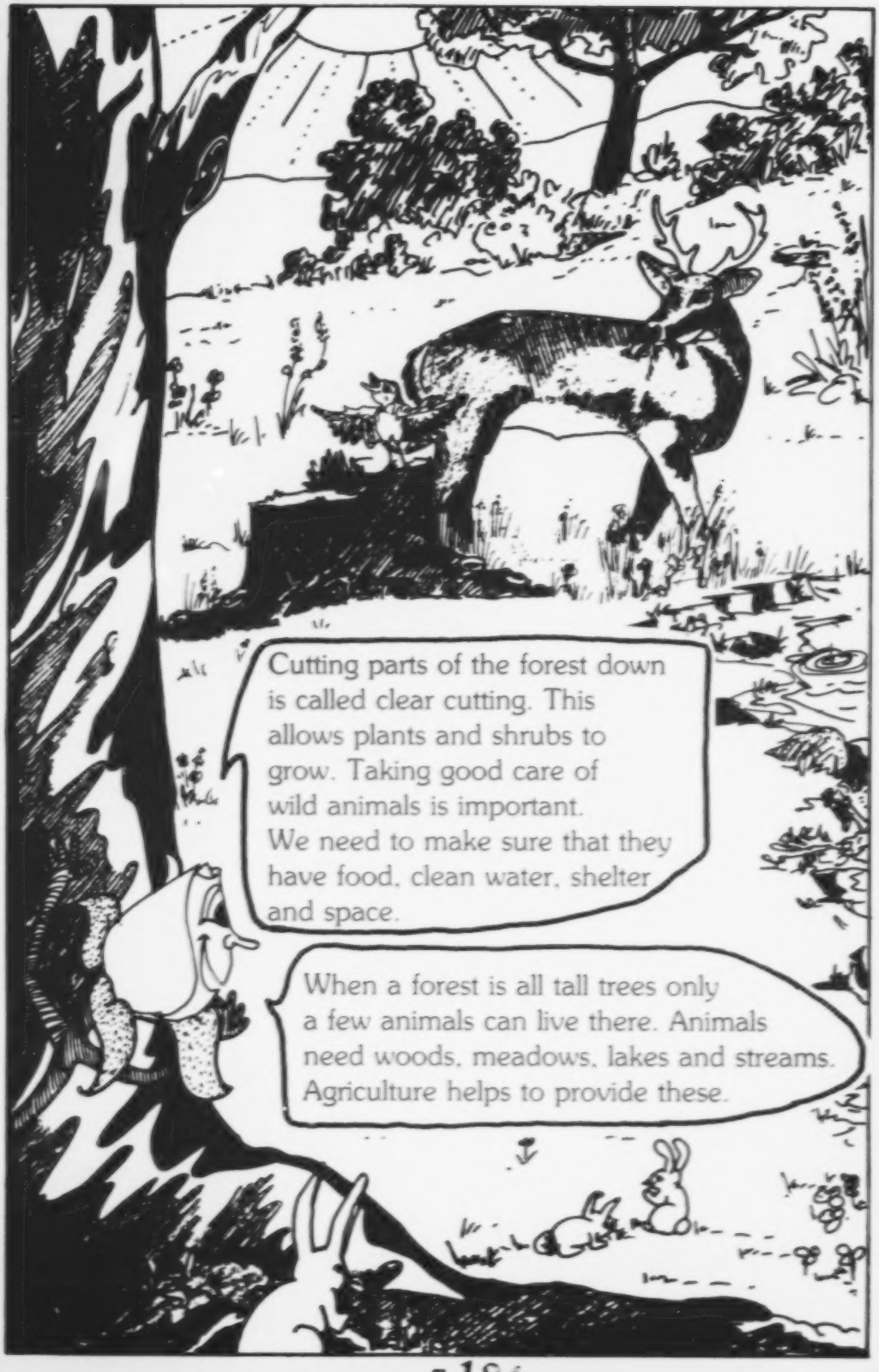
Greenhouses

But we plants know that it is much, much more. It is very *specialized* today.
It is greenhouses, like this one we live in.
Many plants are grown in greenhouses today. In the winter people can buy tomatoes and cucumbers grown in greenhouses. Fresh flowers and live plants are grown here too!

Forestry


Agriculture is also my cousins....these trees. Trees in the forest need care. If they grow too close they will not get enough sunlight.
So, the forest is thinned or sometimes cut right down. Where old trees are cut new ones are planted. These are called tree farms.

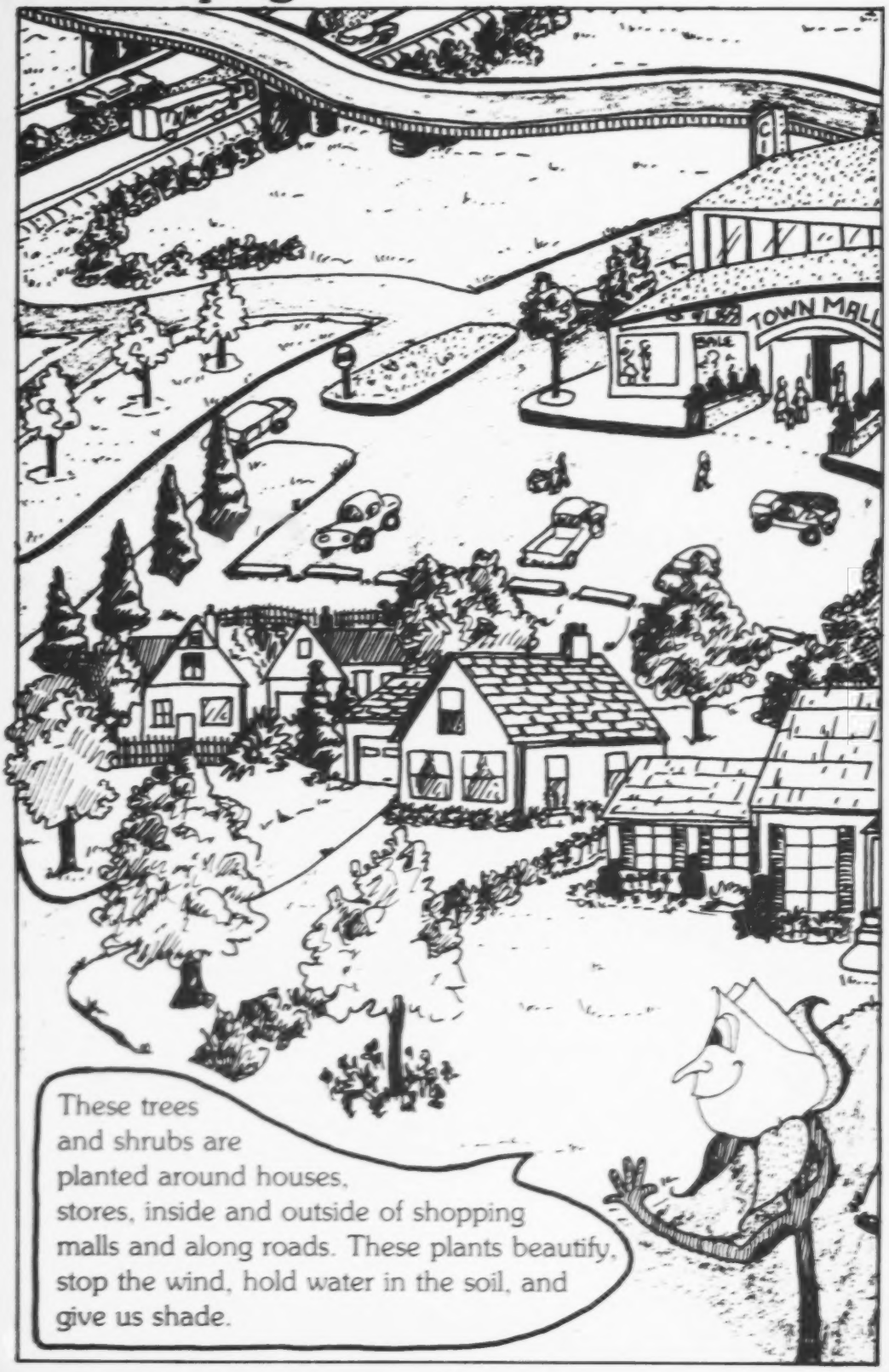
Wildlife


Cutting parts of the forest down is called clear cutting. This allows plants and shrubs to grow. Taking good care of wild animals is important. We need to make sure that they have food, clean water, shelter and space.
When a forest is all tall trees only a few animals can live there. Animals need woods, meadows, lakes and streams. Agriculture helps to provide these.

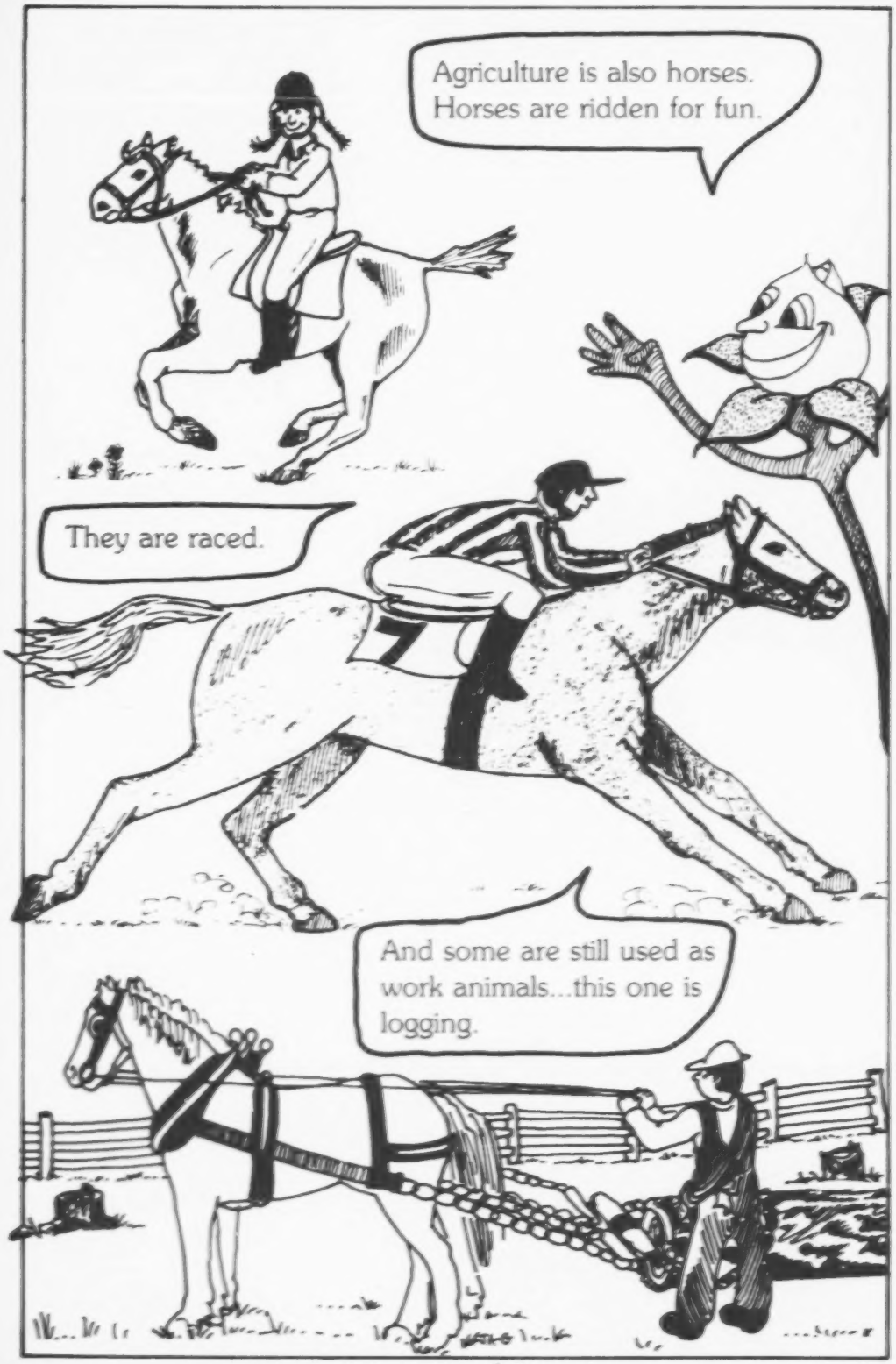
Nurseries

Here is another important part of agriculture. Many trees and shrubs are grown in a nursery.
BUD'S NURSERY

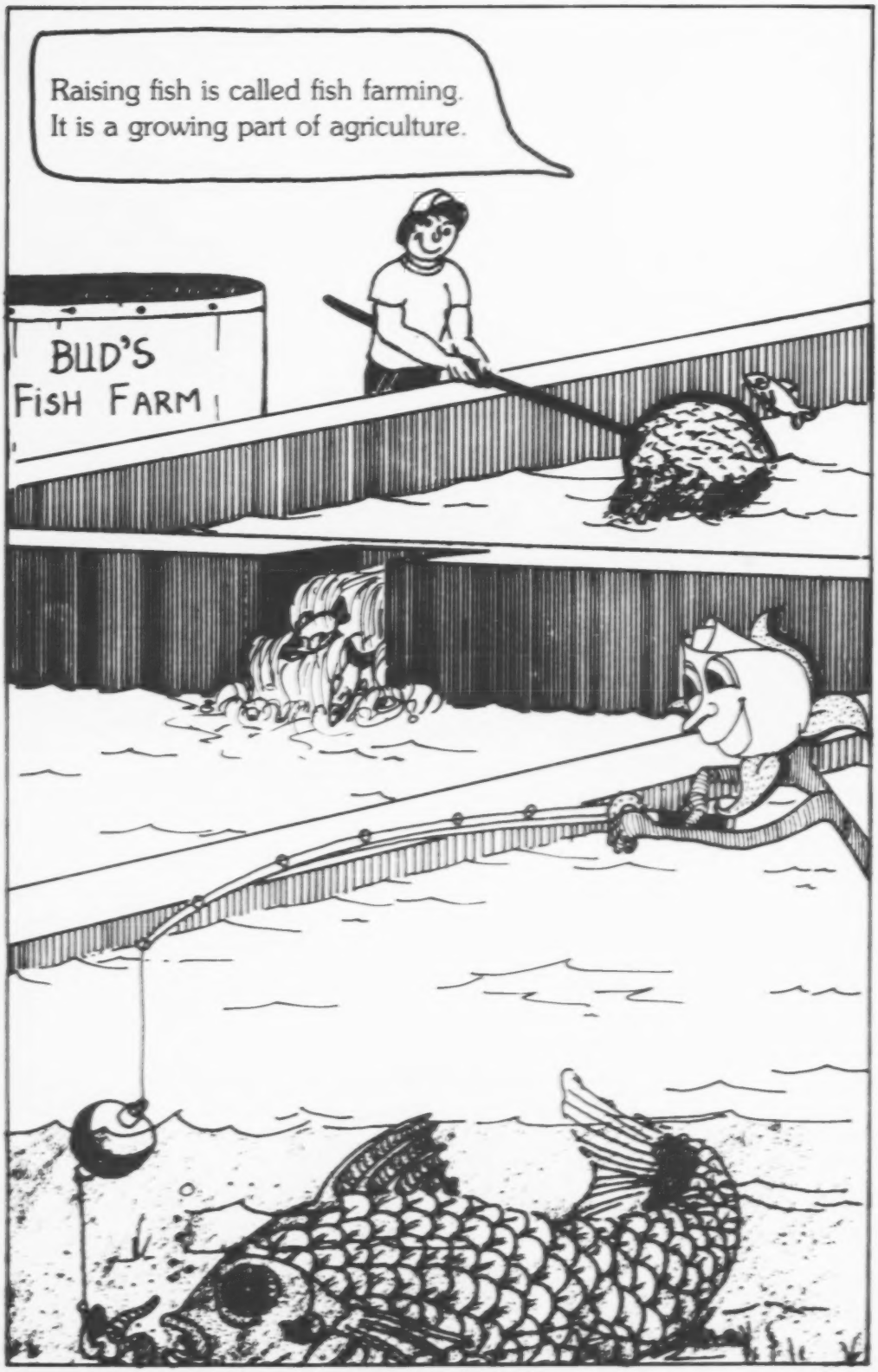
Landscaping


TOWN MALL
SALE
These trees
and shrubs are
planted around houses,
stores, inside and outside of shopping
malls and along roads. These plants beautify,
stop the wind, hold water in the soil, and
give us shade.

Horses


Agriculture is also horses. Horses are ridden for fun.
They are raced.
And some are still used as work animals...this one is logging.

Fish


Raising fish is called fish farming.
It is a growing part of agriculture.
BUD'S
FISH FARM

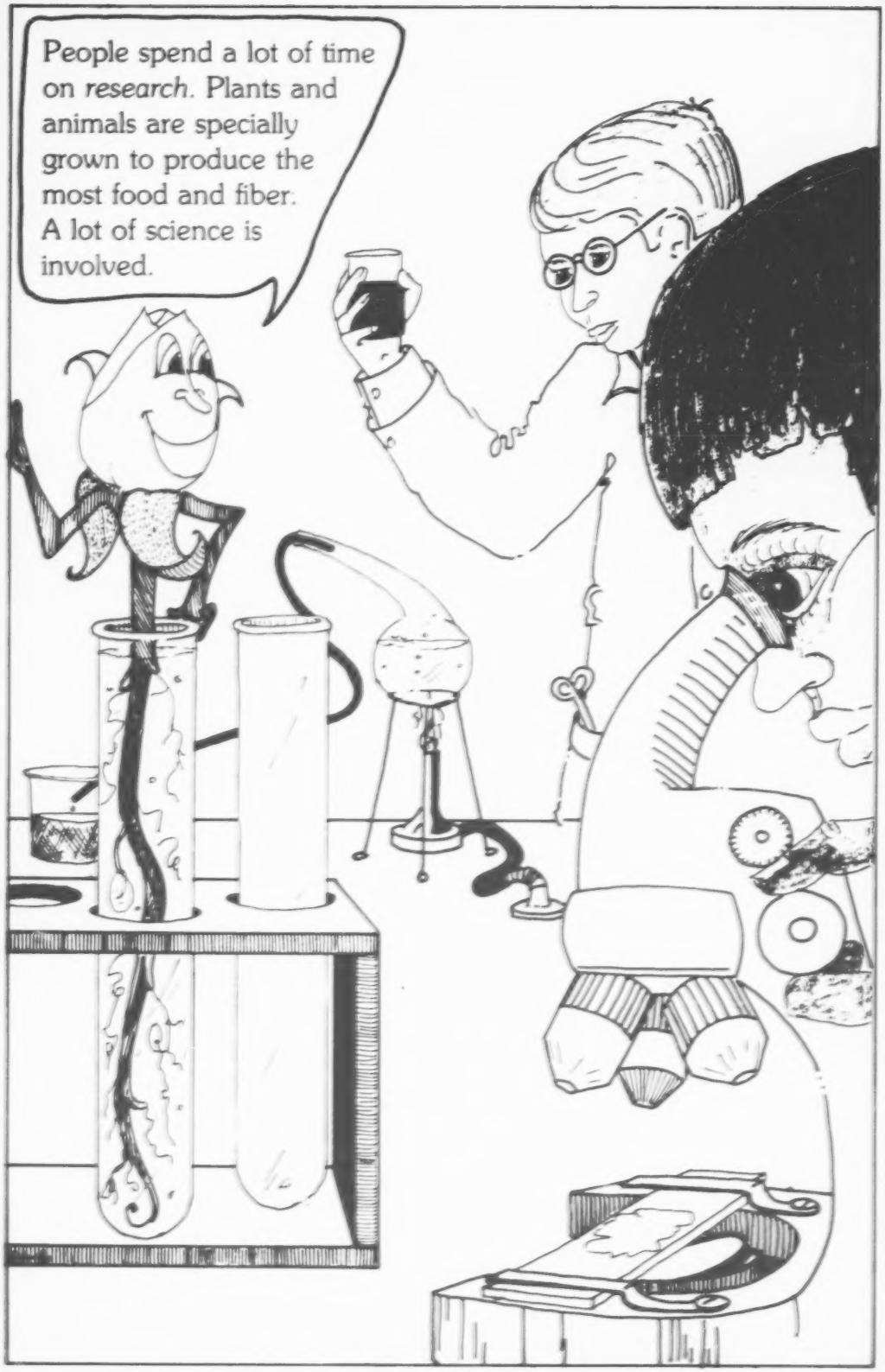
Farming

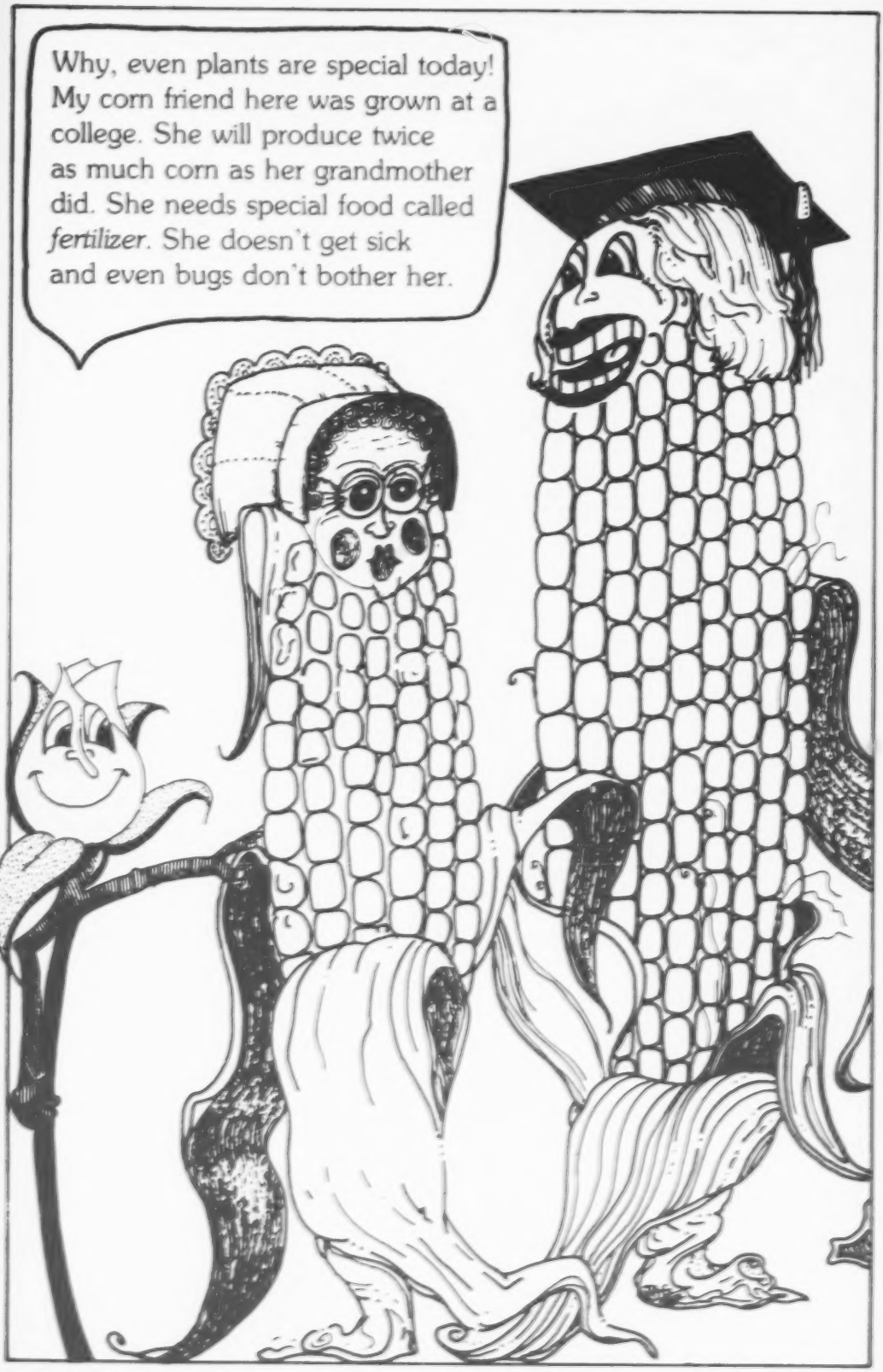
And agriculture is farming too! But, farming today is different. It uses a lot of science!
GASOLINE TRACTOR OF YESTERDAY
The tractors are much bigger and stronger!
DIESEL TRACTOR OF TODAY

Computers

...farm equipment can do more. This combine has its own computer. Combines harvest grain. The computer tells the combine how to do the best job.

Research


People spend a lot of time on *research*. Plants and animals are specially grown to produce the most food and fiber. A lot of science is involved.


Why, even plants are special today! My corn friend here was grown at a college. She will produce twice as much corn as her grandmother did. She needs special food called *fertilizer*. She doesn't get sick and even bugs don't bother her.

Have you guessed yet? That's right! My world is our food and fiber system. Plants and animals or;

FLORA
FEATHERS
FIBER
FUR
FLAVORING
FORESTS
FISH
FAUNA
FOOD
FLOWERS
FUEL
FARMS
FIELDS
FLORIST

Find the words in this list and circle them in the puzzle. They could go from left to right or top to bottom.

F	L	O	R	I	S	T	R	F	F
X	F	S	U	A	O	F	F	E	E
F	L	A	V	O	R	I	N	G	A
U	O	F	F	I	B	E	R	F	T
R	W	U	Z	T	T	L	R	A	H
A	E	E	F	O	O	D	N	R	E
F	R	L	I	F	I	S	H	M	R
O	S	F	O	R	E	S	T	S	S
F	L	O	R	A	F	A	U	N	A

Plants

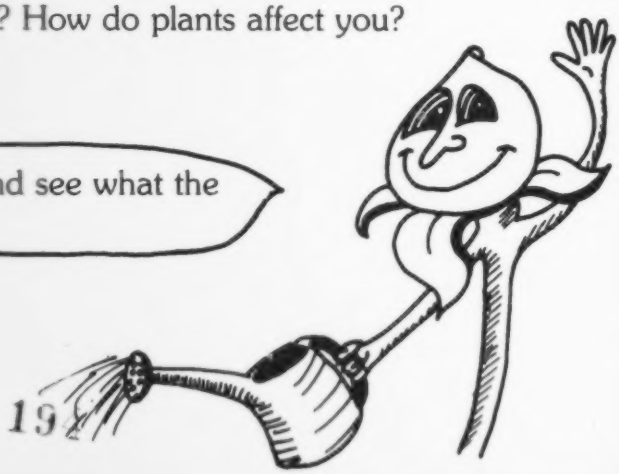
Now that you know more about my world let's look closely at plants.

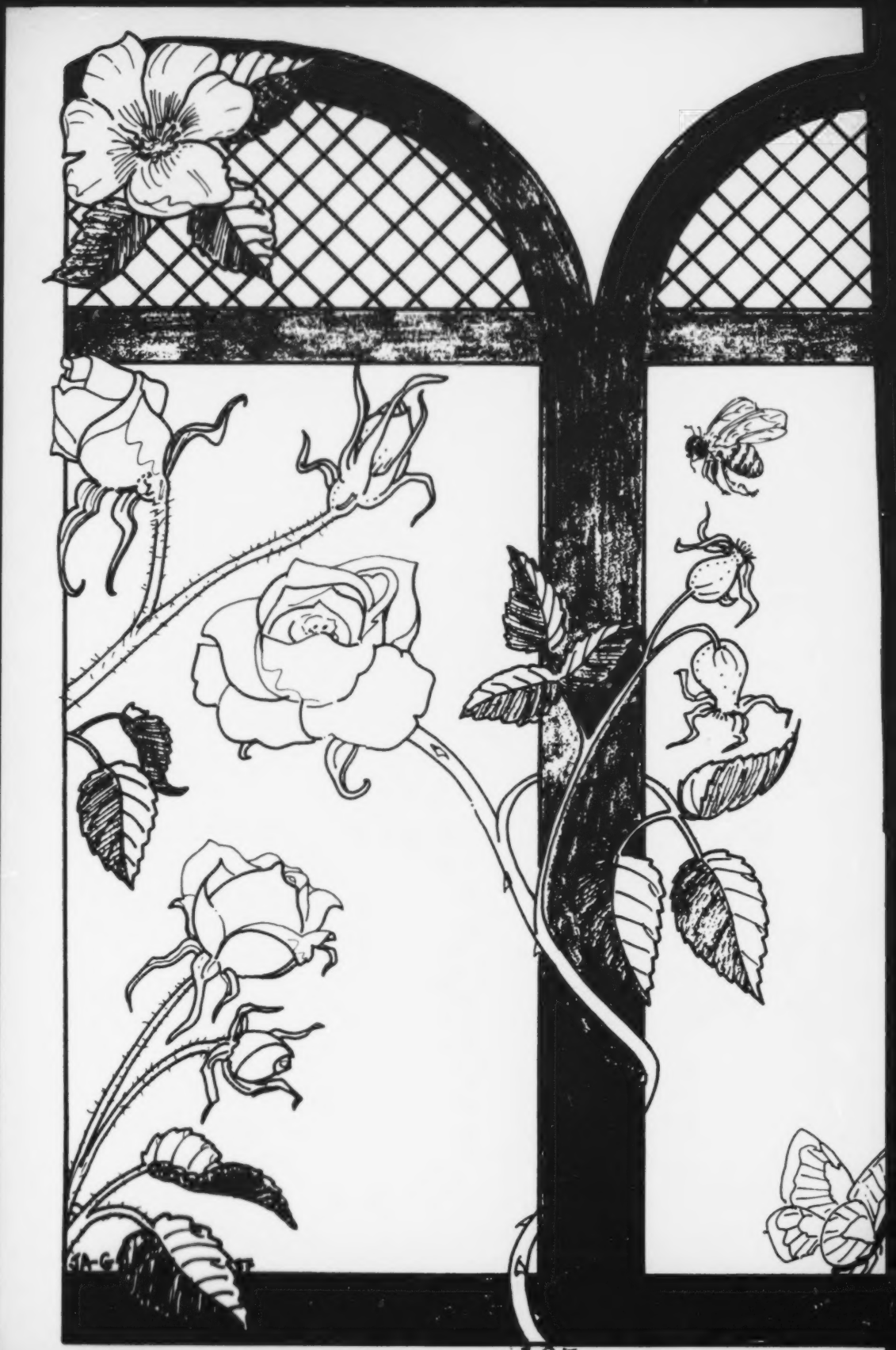
All of the world depends upon plants. Plants take light from the sun, water and minerals from the soil and make food. All animals depend upon that food. Plants also give off oxygen. Without the oxygen from plants animals could not live. Plants also make shade. On very hot days animals are very glad for that fact.

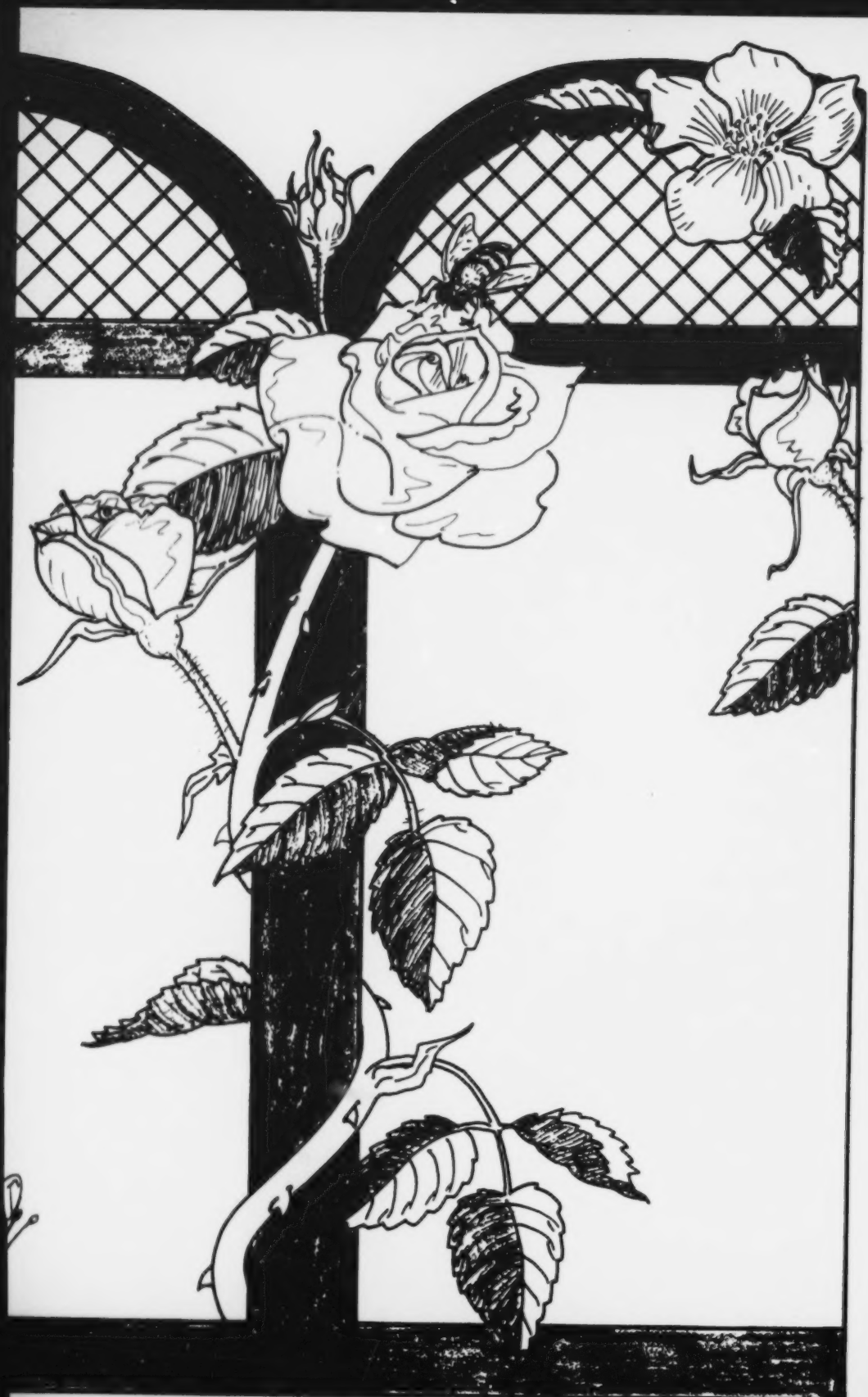
Plants also stop wind and water erosion. What is erosion? It is the wearing away of soil and rocks by wind and water. Plants slow down the wind and hold water in the soil.

What else do plants do? How do plants affect you?

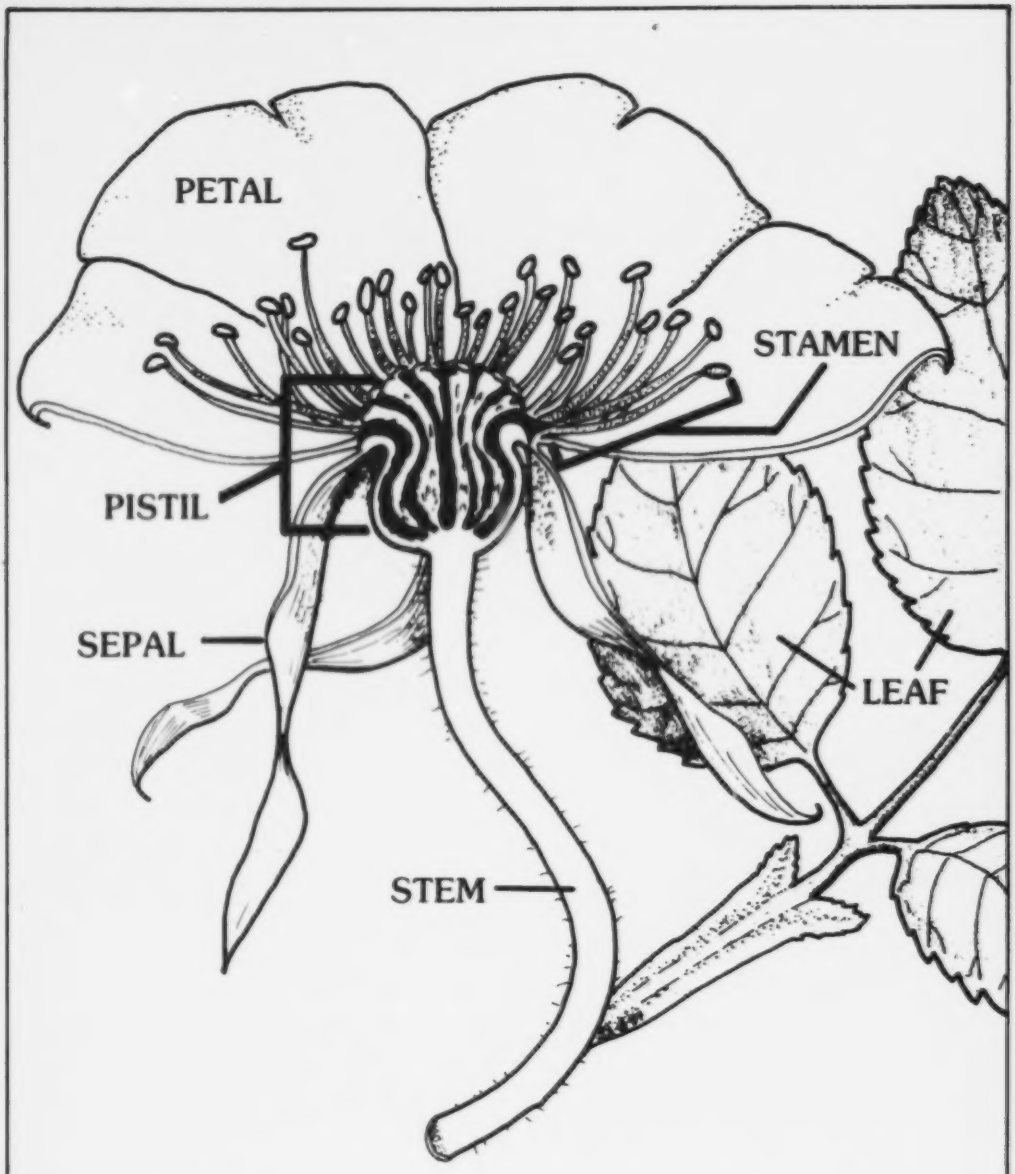
Oh! Turn the page and see what the roses are doing!







THE PARTS OF THE ROSE



The male part of the flower is the stamen. The top of the stamen produces pollen. Pollen is the grainy dust in a flower.

The female part of the flower is the pistil. Inside of the pistil is the place seeds will develop.

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POLLINATION

Roses need to be *pollinated* before the rose can make seeds. Seeds are one of the ways to grow new rose bushes.

Pollination happens when the pollen lands on the pistil. The top of the pistil is sticky. Any way that pollen can travel to this sticky area helps pollination.

Some plants are pollinated by the wind. Corn is a plant that is wind pollinated. Some plants such as the vanilla orchid need to be pollinated by humans. A great deal of pollination occurs with the help of animals.

How do animals help? When they are searching for food they pick up pollen on their legs, wings, or bodies. As they travel around the flower they touch the pistil and pollen is left behind.

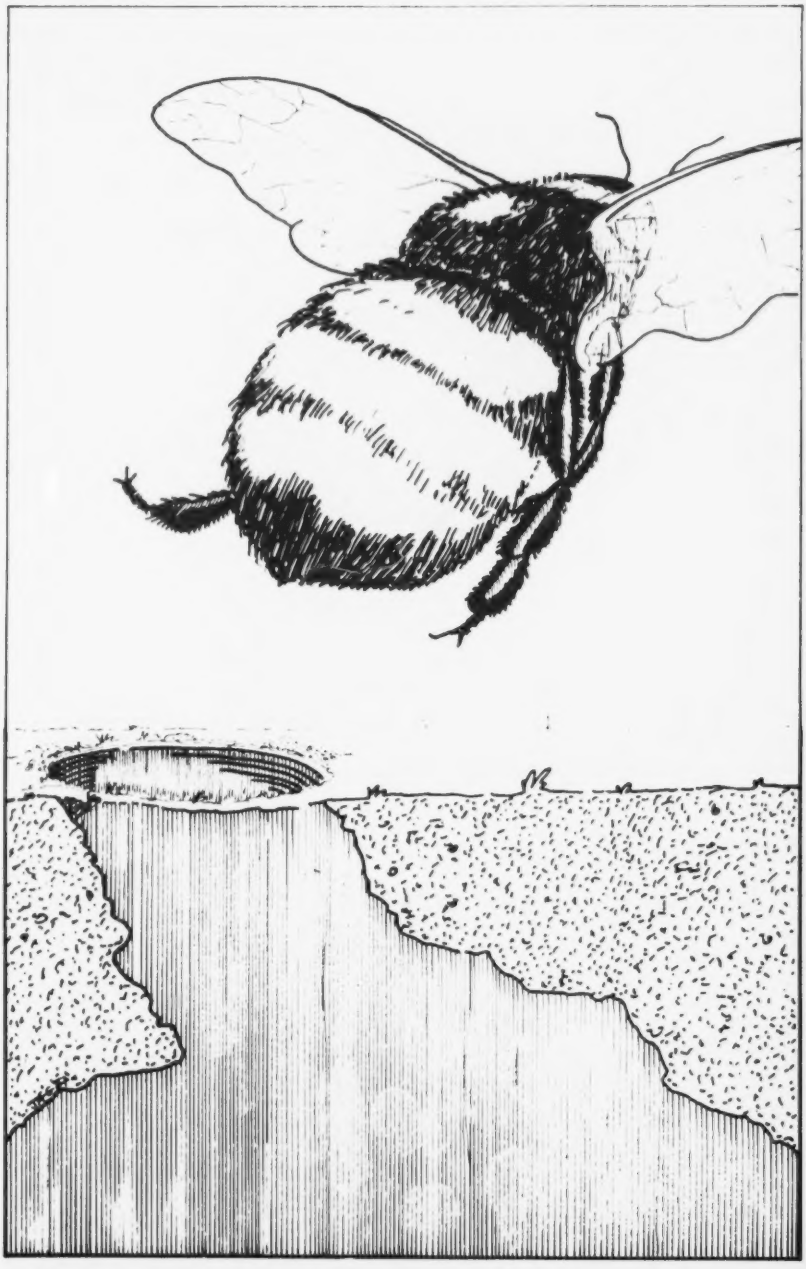
Flowers petals are brightly colored to attract these animals. Flowers have pretty scents for the same reason. Some flowers only bloom at night so that bats and moths can pollinate them. This is also the reason that flowers contain nectar. The sweet nectar is all the way at the bottom of the flower so that the insect or bird has to come in contact with the stamen and pistil.

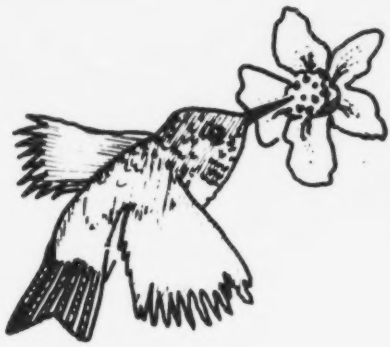
198

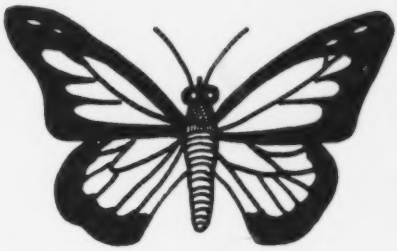
Pollinators

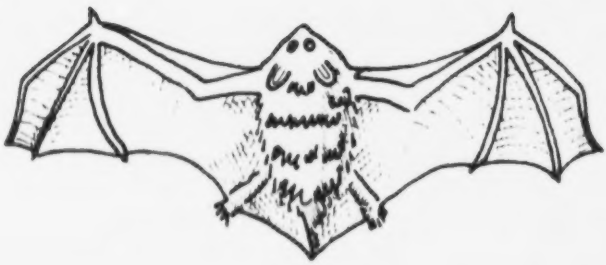
USE THESE WORDS TO LABEL
THE POLLINATORS ON THESE TWO PAGES:

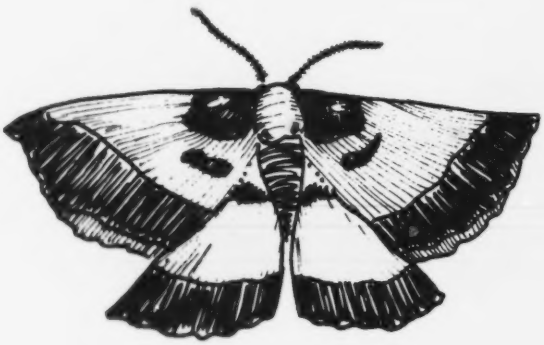
ANTS
BUMBLE BEES
SQUIRRELS
MOTHS
BUTTERFLIES
BATS
HUMMING BIRDS











200

One of the plant's best friends is the honey bee. Why? The honey bee is a great pollinator! Many of the foods you eat need honey bees.

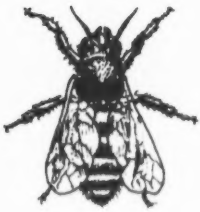
UNSCRAMBLE THESE LETTERS TO MAKE WORDS OF PLANTS THAT NEED HONEYBEES:

P A L E P	_____
H R R E C Y	_____
N M L S E O	_____
S P R E A	_____
U M U E C C B R	_____
P K U M N I S P	_____
M N D O A L	_____
W S A T R	_____ berry
U L E B	_____ berry
U S S Q H A	_____

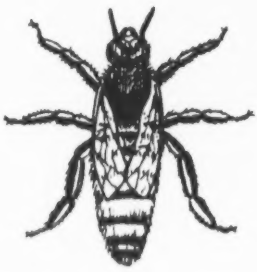
HINT: The words are: apple, cherry, melons, pears, cucumber, pumpkins, almond, strawberry, blueberry, squash

THE HONEY BEE

Honey bees live in large groups. These groups are called colonies. Their home is a hive or a beehive. In every hive there are three kinds of bees. There is the queen bee, drone bees and worker bees.



WORKER BEE



QUEEN BEE

DRONE BEE

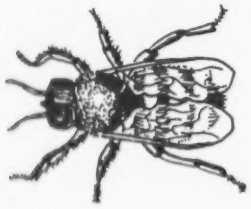
THE QUEEN BEE

The queen bee is the largest bee in the colony. There is only one queen in the hive. The queen lays the eggs. She also rules the hive and keeps it together. She is fed and cared for by the worker bees. Without a queen the colony would soon die.

What happens if there is more than one queen?

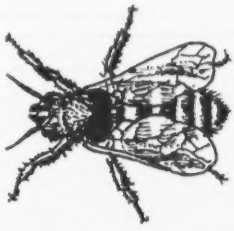
New queen bees are made when the hive becomes crowded. The old queen lays eggs. Special food and cells are made for some of the eggs. Then the old queen takes half of the bees and they *swarm*. Bees are swarming in the drawing on the branch.

When the queens hatch, only one will live to become the new queen. She will kill the others that hatch.



THE DRONE BEES

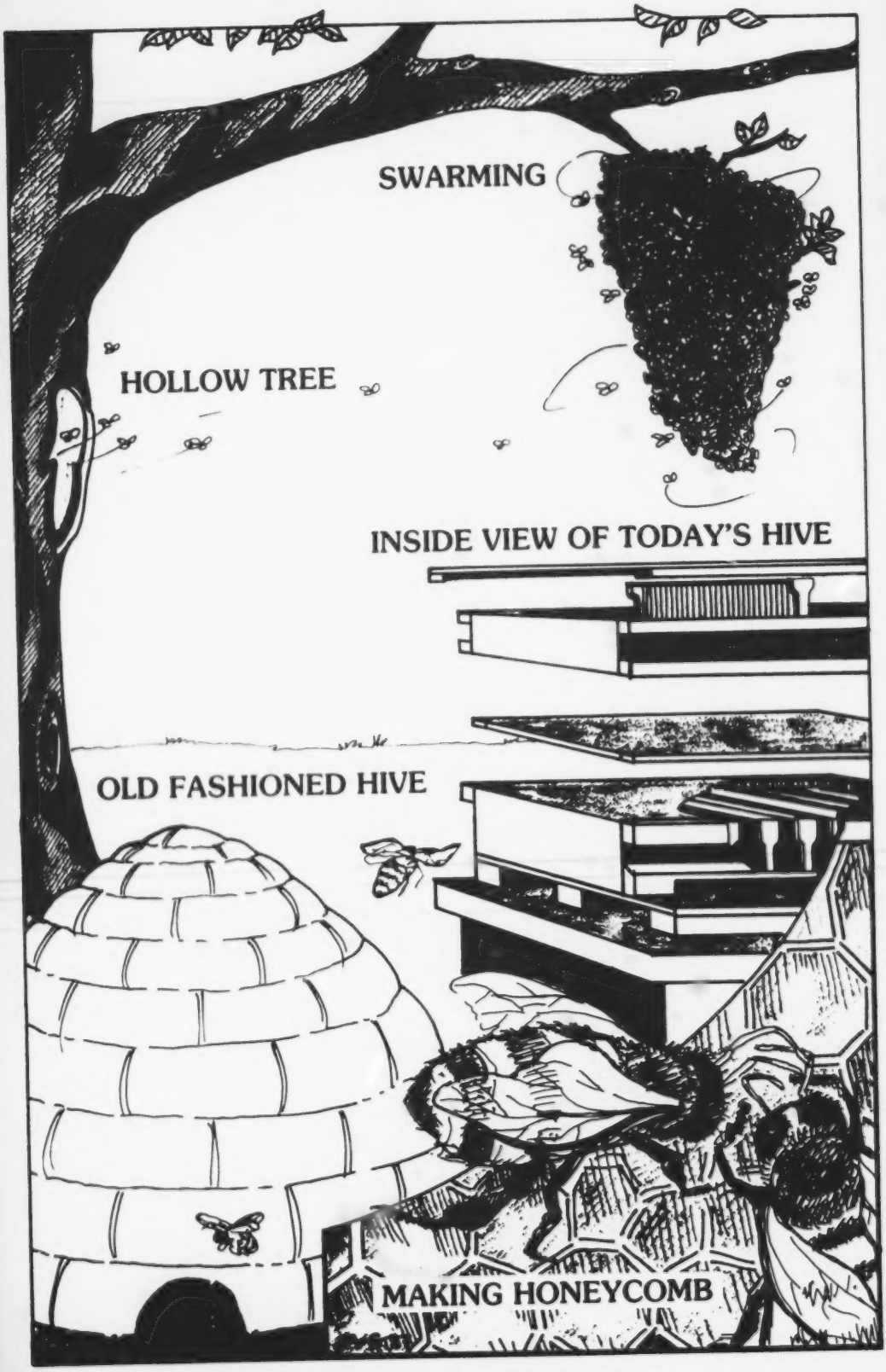
The drone bees are the male bees. Their job is to mate with the queen. They are shorter than the queen but have fatter bodies. The drones are also fed by the workers. They do *no* work. In the fall, when honey is low, the workers will push the drones out of the hive.



THE WORKER BEES

Most of the bees in the hive are worker bees. They are the smallest bees in the hive. These are the bees that are seen gathering nectar and pollen.

The worker bees in the picture are swarming around the queen, entering the hollow tree. In old fashioned hives the workers would build honey comb and fill it with honey. Today a modern hive is built of wood. The picture shows what the inside looks like.


SWARMING
HOLLOW TREE
INSIDE VIEW OF TODAY'S HIVE
OLD FASHIONED HIVE
MAKING HONEYCOMB

It is by gathering nectar and pollen that the worker bees pollinate flowers. As they crawl through the flower they collect pollen in a "pollen basket" on each hind leg. Pollen is used as food back in the hive. Some of the pollen gets stuck on the pistil of the flower or on the next flowers the honey bee travels to.

The worker bees do many jobs.

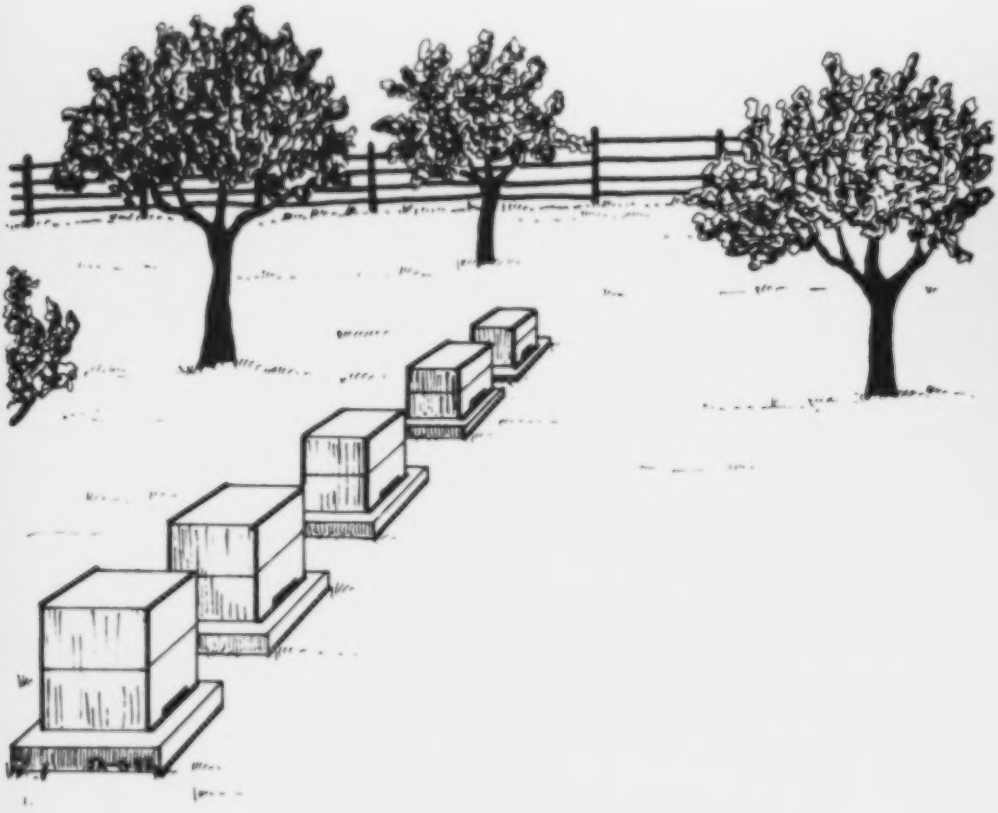
THE JOBS OF THE WORKER HONEY BEES ARE TO:

MAKE WAX TO BUILD HONEYCOMB
BUILD HONEYCOMB
COLLECT NECTAR
MAKE HONEY FROM THE NECTAR
MAKE FOOD CALLED *BEEBREAD*
FEED THE COLONY
KEEP THE HIVE CLEAN
FAN THE HIVE TO MAKE IT COOL
GUARD THE HIVE
COLLECT POLLEN

The worker bees do all of these jobs at some time in their lives. Because they work so hard they do not live very long. In the summer the workers live about six weeks. In the winter, when they don't work so hard, they may live six months.

WHY DO BEES STING?

The *sting* or *stinger* is for protection. At the bottom of the sting is a gland that holds poison. The poison is one reason the sting hurts. When a honey bee stings a person or an animal the bee dies. The little bee will die to protect the hive.



All of the work that the busy worker bees do is very important to plants and people. More than three-fourths of all crops that need to be pollinated depend on the honeybee.

Pollination is so important that farmers will rent bees. A beekeeper will bring the hives into the orchard in the spring. When the trees bloom the bees go to work. After the trees are pollinated the beekeeper will move the hives to another place.

It is very important to people that honey bees pollinate. It is also important that honey bees make honey!

The beekeeper knows how to work with the bees. Bees need food, water and shelter just like you do. If the bees are well taken care of the beekeeper will get a lot of honey.

The modern hive allows for honey and bees to be taken out easily. The hive has *frames* for the bees to work in. The beekeeper can take these out of the hive. Some frames are used by the queen to lay eggs in the comb. On top of these are frames for honey to be stored. The beekeeper knows when to remove honey. The bees need to have enough honey to feed themselves.

Bees might be moved to prevent swarming. Or maybe the hive needs a new queen? This is all a part of the beekeepers job. The tool that Bud has is a smoker. The beekeeper uses this to calm the bees so that they may be worked with.

After the honey comb is removed from the hive it is made ready for sale. Sometimes it is sold as comb honey, just as it is. Or the honey is removed from the comb. Honey is sold in many forms.

207

HONEY
BEAR
FRE
HONI
20 fl oz
JA-GER

EARTHWORMS

Pollinating is not the only way that plants and animals help each other. Earthworms are a good example.

An earthworm lives by digging tunnels through the soil. These tunnels are called burrows. As the worm digs it eats. The earthworm eats dead plants and animals, soil, sand and even small pebbles. An earthworm eats as much as it weighs each day. At night a type of earthworm called a night crawler will tunnel above ground and leave its droppings. These droppings are called castings. Have you seen them?

An earthworm will also break up leaves. After the leaves are in small pieces the worm will drag them into its burrow. It will eat these later.

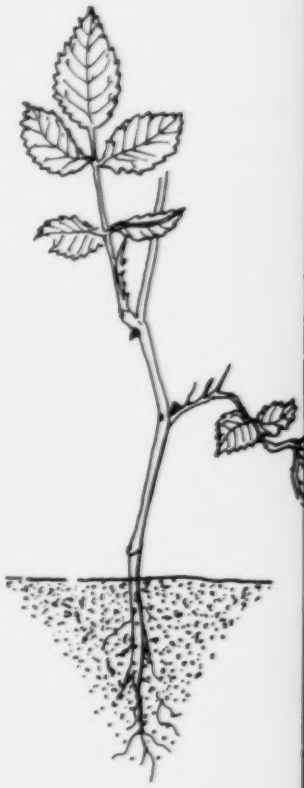
All of this helps plants. A plant's roots need to breathe. So, they need both water and air. The tunnels that earthworms leave make room for air, water and roots. When it rains the tunnels help water to flow through the soil. When empty, the tunnels create air pockets for the roots. The dead leaves that the worms drag into the tunnel make the soil better.

When you look at an earthworm it is hard to tell which end is the front and which is the rear. The darker end that is more pointed is the front. This is where the mouth is. The rounded end is the rear. Look at an earthworm and see if you can tell which end is the front and which is the rear.

Life Cycle of the Rose

ROSE HIP

BLOSSOM AND POLLINATION

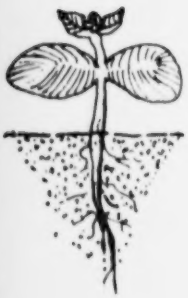


211 YOUNG PLANT GROWING

SEEDS

PLANTING

SPROUTING



FIRST LEAVES

Please fill in this form and give it to your teacher.

1.) Did you enjoy reading this booklet?
yes_____ no_____

2.) What section did you like best?

_____

3.) What section would you like to learn more about?

_____

_____

4.) Do you understand more about agriculture after reading this booklet?
yes_____ no_____

5.) Did you like the puzzles?
yes_____ no_____

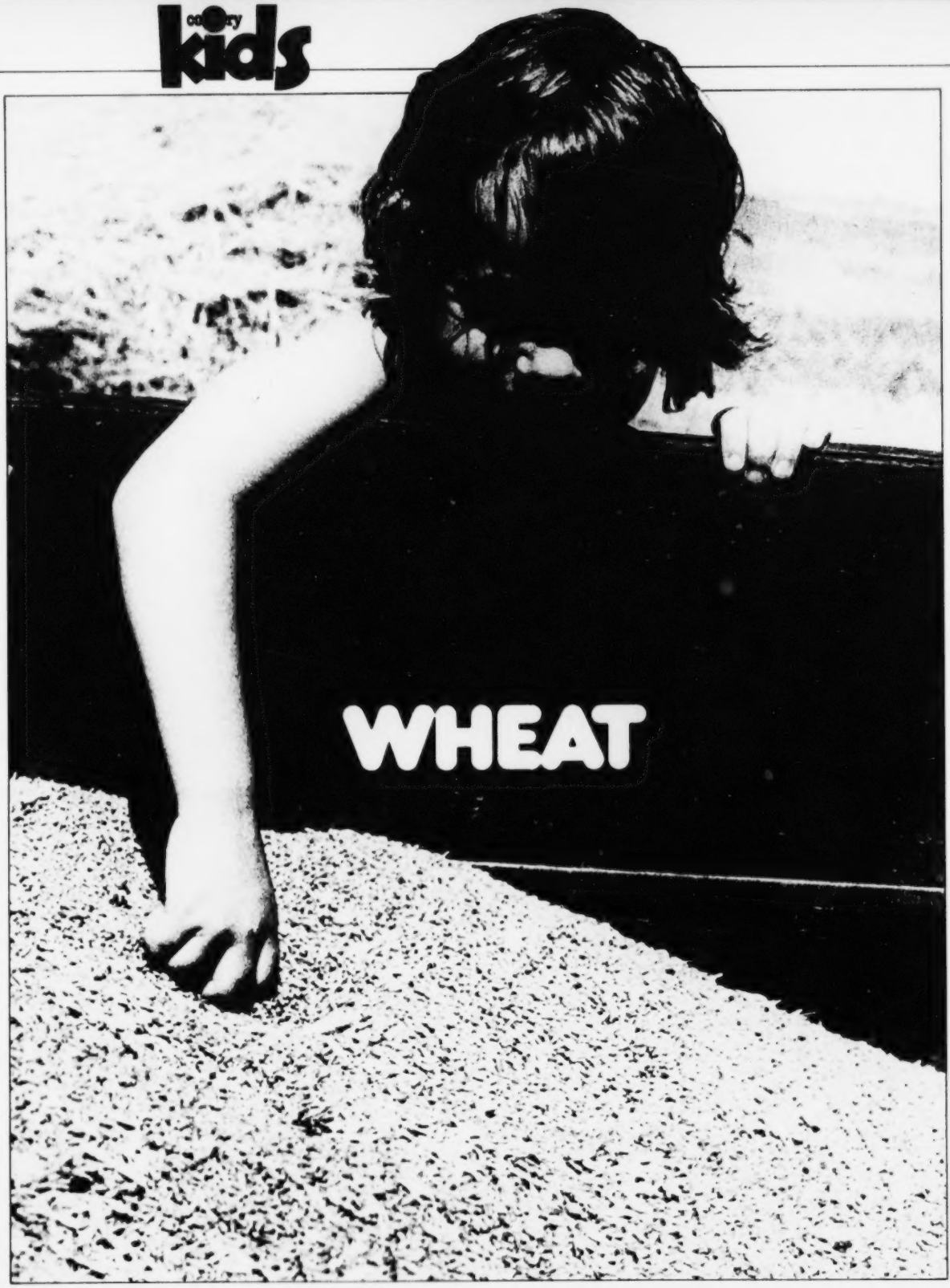
6.) What is Bud's World?

_____

_____

_____

_____



Reiman Associates, 1983

WHEAT

HI KIDS... I'M WILLIE WHEAT!

I'm a kernel of wheat, and I grew up in a big field in Kansas. Did you know that more wheat is grown in Kansas than in any other state? I think you'll find it interesting how Kansas became such an important wheat state, but I'll save that story for later.

First, let me tell you about my home—that wheat field in western Kansas where I grew up. There were millions and millions of other wheat kernels in that big field with me—in fact, there were 50 other kernels in the very same head of wheat with me. (Pretty crowded, huh?)

You see, wheat kernels aren't very big—we're even smaller than your little fingernail! There are about 15,000 of us in just 1 pound. So, with all the *billions* of wheat kernels around, I figure I'm really lucky to have been chosen "Guest Editor" of this 16-page Pullout Section! There's lots I want to tell you about wheat, so let's get started.

TO BEGIN, let's get out my family album. I want to show you a special picture of one of my brothers—you'll see it over there on the page at right. The photographer made the picture 35 times bigger than we actually are...how else was I going to show you how complicated we wheat kernels are?

Next to that big picture is a photo of one of my favorite farm boys, 6-year-old Matthew Jaeger, from Leoti, Kansas. He's holding a handful of my wheat kernel friends to give you an idea of what size we really are. (You wouldn't want me to get a big head, would you?)

The large white part of the kernel that you see in the picture is called the *endosperm*. It's the part that's ground to make white flour.

The hard outer covering is the *bran*. It has lots of different layers.

The tiniest part of the kernel is the *germ*. It's the part that would grow into new wheat if the kernel were planted.

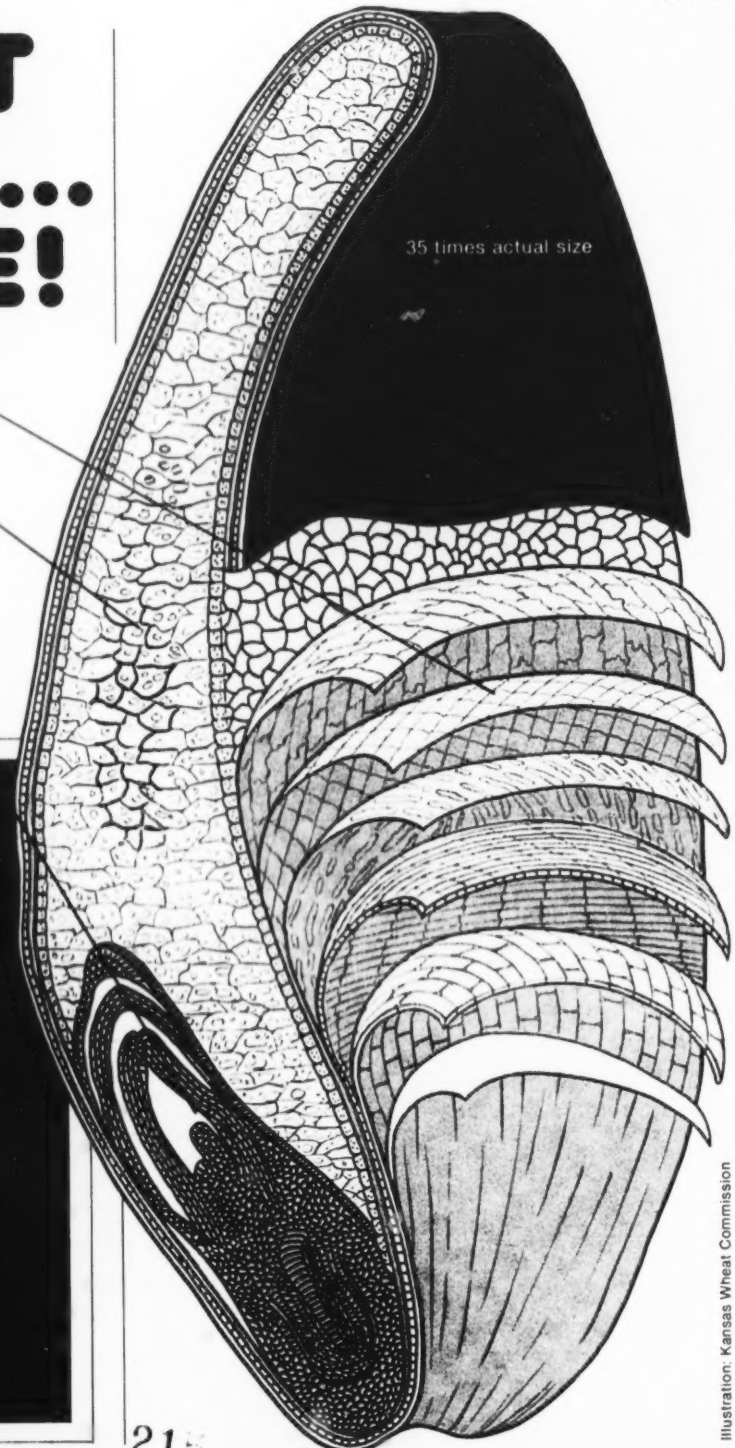
We're Good for You!

If the bran and the germ are ground together with the endosperm, that makes whole wheat flour. The bran is also used in cereals and for livestock and poultry feed.

The germ sometimes is added to baked goods and casseroles. Wheat germ is rich in vitamin B and has lots of vitamin E. Those vitamins are important. They help people grow and stay healthy.

Now, let's see...there are pictures somewhere in my album that show the field of wheat where I grew up. I'll tell you about it while I look for them. I'm

A WHEAT KERNEL... UP CLOSE!



BRAN LAYERS
(14-1/2% of kernel)

ENDOSPERM
(83% of kernel)

GERM
(2-1/2% of kernel)

HANDS FULL. Matthew Jaeger, 6, holds wheat kernels from his family's Kansas farm.

Photo: Joan Istas

Illustration: Kansas Wheat Commission

what's called *winter wheat.* Winter wheat gets planted in the fall. It grows for a while, and then it rests in the ground over the winter. It starts growing again in spring. Most of the wheat grown in Kansas and other parts of the southern Great Plains is winter wheat.

Other wheat is planted in the spring, so it's called *spring wheat.* It's grown farther north, where very cold winters would kill wheat planted in the fall.

Home Was Hard Work

Ah—here are those pictures I was looking for of my home field in Kansas. The field of wheat I came from took a lot of hard work to begin.

First, the family who owns the farm where I grew up had to prepare the soil for planting. They used their big tractor to pull a plow over the field to turn the soil and kill weeds. Then they broke the soil into smaller pieces by pulling a disk harrow over the field.

When the soil was ready in the fall, they planted wheat seeds with a machine called a grain drill. You're in luck—I've got a picture in my family album that shows how a drill works. It's below at the left.

The moisture in the soil is what made my wheat plant in that big field start growing. At first, the germ—that's the growing part of the wheat seed—got its food from the endosperm. As my wheat plant grew bigger, it got food from the soil through its roots, and also made food in its green leaves.

My wheat plant grew to be about 6 inches tall before the first frost came. Then it stopped growing for the winter.

Here in Kansas and other winter wheat states, cattle often graze on small wheat plants like mine before winter comes, and then graze again in the spring before the wheat gets too big. That doesn't hurt the wheat—it just keeps growing back.

Golden Crop

When spring comes, the warm, moist days make the wheat plants grow quickly. They can grow to be as tall as 7 feet, but they're usually 2 to 4 feet tall. Soon the wheat field looks like a beautiful rolling green carpet.

Did you know that wheat is a type of *grass?* Well, it is. (If you didn't mow the grass on your lawn, it would get tall and

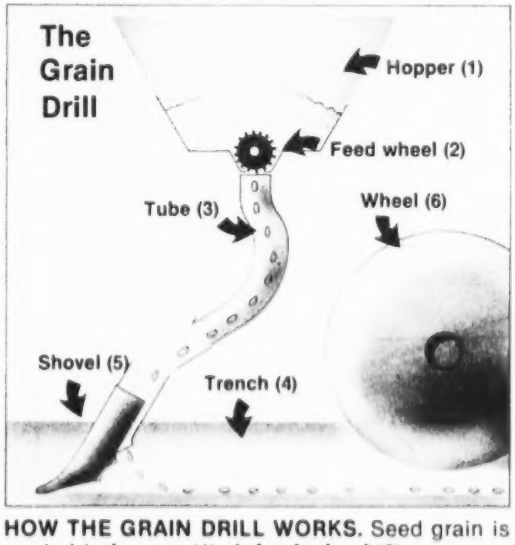


Illustration Don Dyck

HOW THE GRAIN DRILL WORKS. Seed grain is carried in **hopper** (1). A **feed wheel** (2) measures amount of seed to be planted per acre. The seed drops through **tube** (3) and falls into **trench** (4) made by **shovel** (5). Loose soil falls behind shovel and is pressed into trench by a **wheel** (6). Some grain drills have another hopper for fertilizer.

Photo: Joan Istas

GREEN CARPET. It looks as if Kansas farm girl Bret Lysinger's standing in a grassy field. But that's wheat!

form heads just like wheat...but the grass seeds wouldn't be good to eat like wheat kernels are!)

During the summer, the green wheat plants fade to tan and then turn a rich gold color. Here in Kansas and other wheat states, the rippling fields of wheat look like a golden ocean, stretching as far as you can see.

Just the thought of such a beautiful wheat field makes me feel like singing. How about you? All together now: *"Oh beautiful for spacious skies, for amber waves of grain..."* That's my favorite song! But I guess I'd better quit singing and get back to my job as Guest Editor.

When the wheat is almost ripe, farmers have to move fast. They have to "race" with the weather to harvest the crop, because a ripe field of wheat is an easy

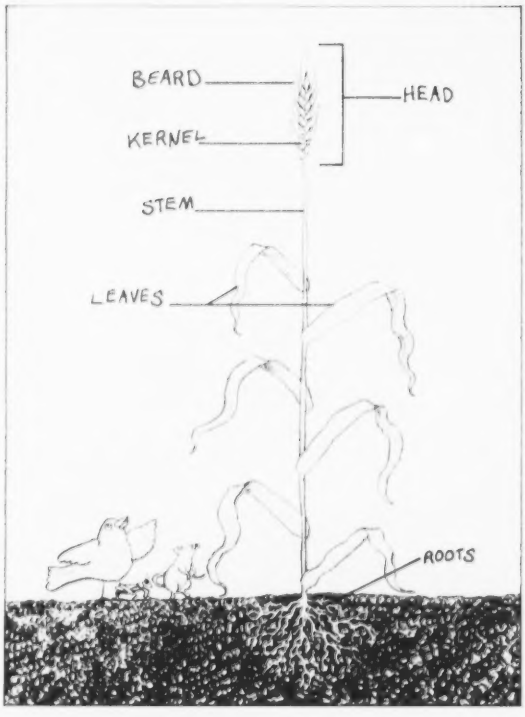


Photo: John Gajda

AMBER WAVES. Ripe wheat heads swell, turn golden.

target for wind, rain, hail and even fire.

Strong winds can tip over the plants so they can't be cut. Rain or hail can smash a whole field of ripe wheat in 5 minutes. And sometimes, lightning starts range fires that destroy thousands of acres of ripe wheat.

Besides all of those problems, wheat can't be harvested if it's rainy and wet. The weather and the moisture content of the wheat have to be just right.

Checking Us Out

How does the farmer know when my friends and I are "just right" for harvest? Most farmers simply take a sample of wheat to the local elevator for testing. There the wheat's checked to see if it's dry enough to harvest.

But many farmers still use the "old-fashioned" method to check their wheat. These seasoned growers rub the wheat head in their hands, blow away the chaff and chew some of the grain. If the kernels crack easily and get soft as they're chewed, then the farmers know the wheat is ready to cut.

Photo: Joan Istas

PRETTY SHARP! Luke Jaeger, 8, snacks on rhubarb as he helps his dad check cutting blade on the combine.

Wheat doesn't ripen at the same time everywhere in the United States. Harvest begins in May in southern wheat states like Texas and Oklahoma, and then moves north as the summer goes along. In the Pacific Northwest, harvest begins in late summer and lasts until fall.

Harvest season is the busiest time on a wheat farm! The whole family usually helps—and often relatives, neighbors or friends pitch in, too.

There's so much to do on harvest days—the equipment needs to be fueled and greased, and other farm chores have to be done extra early. The farm wife usually prepares meals that can be eaten in the fields, so the workers don't have to go to the farmhouse. Everyone works until long after dark.

Combine's Quick!

Wheat is harvested with a giant machine called a *combine*. It cuts, separates and cleans the grain all at the same time as it moves through the field.

Before the combine was invented, the farmer had to use two separate machines—a *reaper* or *binder* cut the grain, and a *threshing machine* separated kernels like me from the husks and stems. The combine is called that because it "combines" the jobs of both those old machines.

Combines have sure made wheat harvest faster and easier! It used to take

Photo: Marge Lawson

RIPE ENOUGH. Virgil and Laurie Lawson like to check wheat on farm near Sylvan Grove, Kansas.

EATIN' ON THE GO! The Naught family eats lunch in the field during busy wheat harvest on their Washington farm.

HARVEST'S HERE! Many combines work together to harvest the big wheat fields of the Great Plains. Crews follow the ripening wheat from south to north. U.S. farmers grow 2.7 billion bushels of wheat on 380,000 farms.

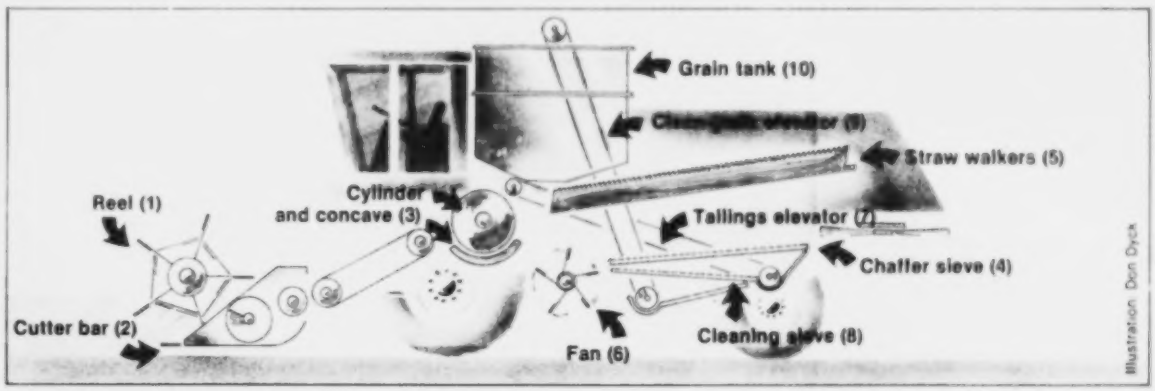
Photo: Wheat Flour Institute

about 3 whole days to cut and thresh an acre of wheat...but now a farmer with a large combine can harvest an acre of wheat in 6 minutes!

How'd you like to tour the inside of a combine? I've already been inside one, so I'm sort of an expert. The drawing below shows what happens inside the combine...for us wheat kernels, it's like a wild ride on a roller coaster!

The wheat kernels are removed from the wheat stems and go into a storage bin on the combine. When the bin gets full, the kernels are dumped into a truck. When the truck is filled, the grain is taken to a storage bin on the farm or to a grain elevator.

The grain elevator's storage bins look like giant white silos. The grain is emptied into a pit and then gets raised or

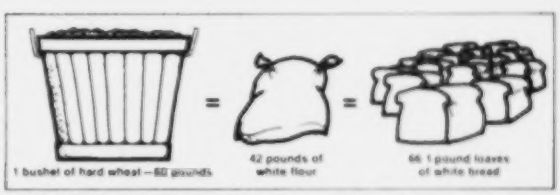


HOW THE COMBINE WORKS. The **reel** (1) pushes the wheat stalks against the **cutter bar** (2) which cuts the stalks off. The cut wheat is carried to the **cylinder** and **concave** (3) where the kernels are separated from the straw and chaff—that's called "threshing".

The kernels and chaff fall onto the **chaffer sieve** (4) and the straw goes up onto **straw walkers** (5). Any kernels mixed in with the straw are shaken out onto the chaffer sieve as the straw moves along the straw walkers. Then the straw is dumped out the rear of the combine.

Meanwhile, the kernels and chaff move to the rear along the vibrating chaffer sieve. The **fan** (6) blows the chaff from the grain and out the rear of the combine.

Any unthreshed wheat heads—called "tailings"—drop through the larger openings at the rear of the chaffer sieve and are carried by the **tailings elevator** (7) back to the cylinder for rethreshing. Clean kernels fall through **cleaning sieve** (8). From there, the kernels are taken by **clean-grain elevator** (9) to **grain tank** (10).



LOTS OF LOAVES. How long would it take you to eat 66 loaves of bread? They all come from 1 bushel of wheat.

TEAMWORK. At top, Nealey family waits for combine bin to fill. Above, Tammy and Todd have fun at elevator.

"elevated" into one of the tall bins. In many small towns in Kansas and other wheat states, the grain elevator is the tallest building around!

At the elevator, each load of wheat is sampled and graded. The price the farmer gets for the wheat depends on its grade (like some kids' allowances depend on the grades they get in school).

Wheat is grown in most all of the 50 states. Besides Kansas, some important wheat-growing states are North Dakota, Oklahoma, Montana, Texas, Washington, Minnesota and Nebraska.

Oh! I almost forgot that I was going to tell you about how my home state of Kansas got to be such an important wheat state. Many years ago, it was hard to raise a good wheat crop in Kansas because of the weather. Kansas is pretty dry, and winters here are cold.

Then, in 1873, some Mennonite immigrants from Russia settled in Kansas. They brought a hardy type of wheat called Turkey Red. It was a *tough* wheat—it could grow in dry and cold

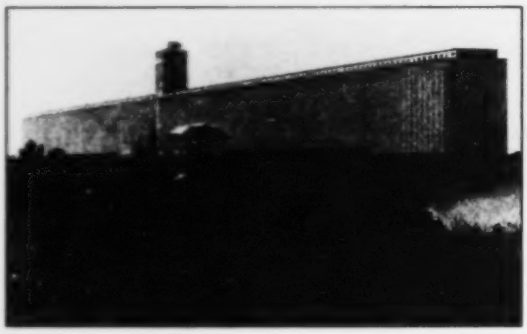
Let's See Wheat Turn into Flour!

PEOPLE who make flour are called millers. If your last name is Miller, chances are someone in your family a long, long time ago worked in a flour mill! In the olden days, people's last names also told what they did.

Old-fashioned flour mills had giant stones turned by oxen or horses that ground wheat kernels into flour. Modern mills are a lot different...you'll see!

Remember that wheat kernels have three different parts—the endosperm, the bran and the germ. The endosperm is the part of the wheat kernel that most people like to eat, and it's the part that's made into white flour. You'll find out how it's done during our tour of a modern flour mill, which starts on the bottom of the next page. Let's go!

WHEAT



GIANT BINS. This Kansas grain elevator is 1/2 mile long, but it can hold wheat from only three counties!

weather. Pretty soon it spread all over Kansas and the Southwest. My ancestors were Turkey Red wheat kernels—that's where I get *my* strength!

Wheat's "Classy"

There are more than 200 different types of wheat grown in the United States, but they're all grouped into five classes based on three things: whether the grain is hard or soft, the color of the kernel and the time of planting. (Remember earlier when we talked about winter wheat and spring wheat?)

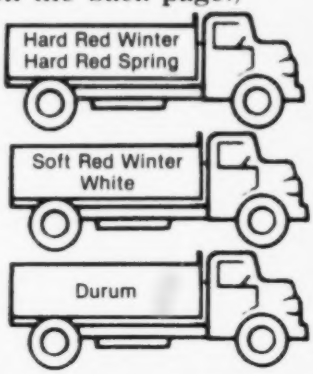
The five classes of wheat are: hard red winter, hard red spring, soft red winter, white and durum. Millers and bakers need to know what kind of wheat they're using, since each kind makes a different type of flour.

You probably like to eat cake and bread and macaroni...but did you know that different types of wheat are used to make each of those foods?

Hard wheat makes the best bread flour. Soft wheat and white wheat are used for cake flour. Durum is the hardest wheat of all—it's used to make flour for macaroni. My friends and I in the wheat field came up with this little quiz that might make you hungry.

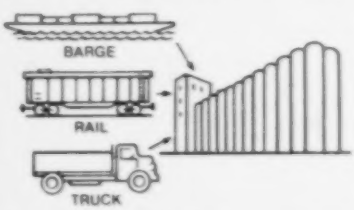
Look at the list of yummy foods below and see if you can figure out what *type* of wheat is in each one. Draw a line from the food to the correct truck. (I've put the answers on the back page.)

Spaghetti
Hard rolls
Cookies
Quick breads
Lasagna
Yeast breads
Cakes
Pastries
Rigatoni
Crackers
Snack foods



Well, how did you do on our quiz?

You'll learn some more interesting things about wheat in the next few pages. So no "loafing" now...let's move on.



STARTING POINT. Wheat from the farm (like me!) comes to the mill in trucks, trains or barges and is stored in giant bins. Workers keep an eye on us wheat kernels to make sure we stay cool and dry so we won't spoil.

REPORT CARD TIME. At the mill, we're put through all kinds of tests (it's a lot like school) even before we're unloaded into the bins. The tests tell the miller what kind of flour we'll be best for.

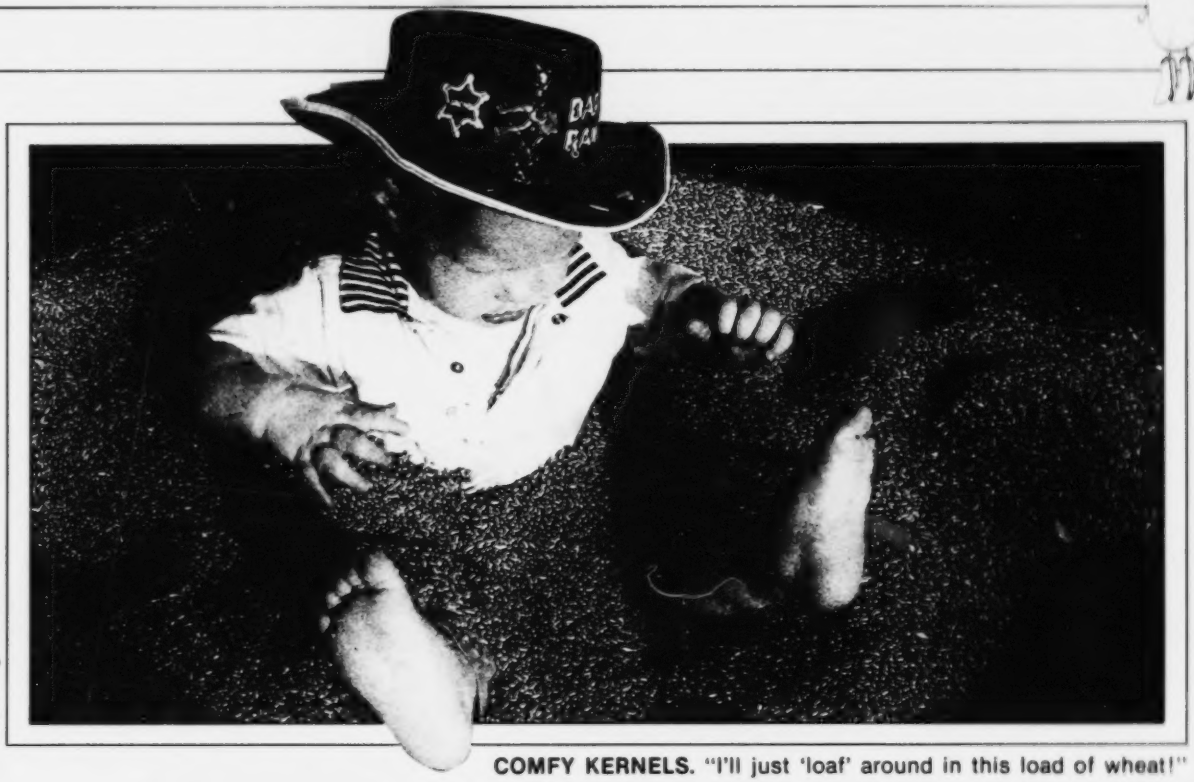


Photo: Marge Lawson

COMFY KERNELS. "I'll just 'loaf' around in this load of wheat!"

IT'S MAGIC!

NOTHING tastes quite as good as a big slice of fresh bread...it's so soft and fluffy and chewy-good!

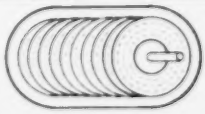
Have you ever wondered why flour made from wheat—instead of some other grain—is used most often to make bread? Flour can be made from other grains, too, like rye, oats and barley. But bread bakers usually choose wheat flour.

That's because wheat contains a magical protein called *gluten*. Other grains have some gluten, but not nearly as much as wheat.

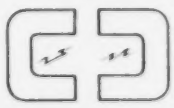
I'll tell you how gluten works...but first I need to tell you about another ingredient in bread—yeast. Besides flour, yeast is the most important thing in bread. Yeast is what makes bread fluffy and light.

When yeast is mixed with warm water and flour to make bread dough, the

ONLY WHEAT ALLOWED. Lots of things can get mixed in with us wheat kernels—dirt, stones, pieces of metal and weed seeds. So we wheat kernels are put through all kinds of cleaning machines.

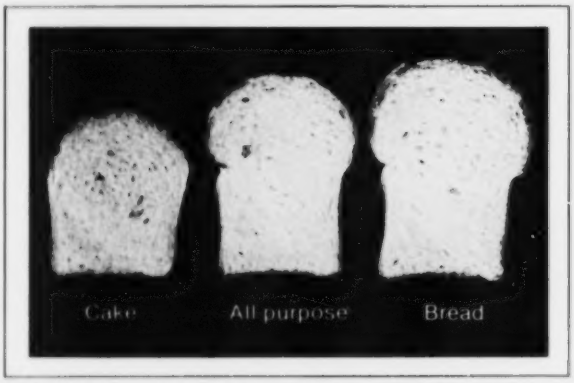


PERFECT FIT. These disks have dents in them the right size to catch only us wheat kernels. Other things won't fit and get spun away.



GIANT MAGNET. This machine pulls out metal pieces like nuts or rivets from farm machines that may have gotten in with wheat.

WHEAT



RISING of bread depends on how much gluten flour has.

yeast gets "active" and makes lots of tiny bubbles.

These bubbles need to be trapped in the dough so it will rise and become light. That's where gluten comes in.

Gluten is very stretchy—sort of like bubble gum! The gluten traps the air bubbles from the yeast and keeps them in the dough. When you see all those little tiny holes in a slice of bread, that's where the gluten "bubbles" were!

Since other grains don't have as much gluten as wheat, bread made from other grains doesn't get as soft and fluffy.

Thirsty Experiment

You can see for yourself how much gluten there is in different kinds of flour with a simple experiment. You'll need 1 cup of wheat flour, and 1 cup of rye or barley flour for this experiment.

Gluten is a "thirsty" protein—it soaks up a lot of water. First, mix enough water with the wheat flour to make a smooth dough like clay.

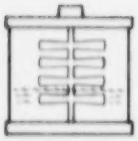
Next, mix exactly the same amount of water with the rye flour. You'll find that it stays sticky and wet—there isn't enough gluten to soak up all that water!

Not all wheat flours contain the same amount of gluten. Remember, earlier you learned that flour made from certain kinds of wheat works better for different foods, such as bread or cake.

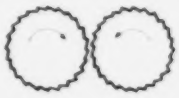
Look left at the three tiny loaves of bread made from flours ground from different kinds of wheat.

The loaf made from the bread flour rose the most because the flour was milled from hard wheats that contain the most gluten. The loaf made from cake flour rose the least because the flour was milled from soft wheats that contain the least gluten. All-purpose flour is a blend of hard and soft wheats, so it's in the middle.

Now you know all about gluten. Next time you're blowing bubble-gum bubbles with friends, tell 'em what Willie Wheat taught you about gluten. Your friends will think you're mighty smart!



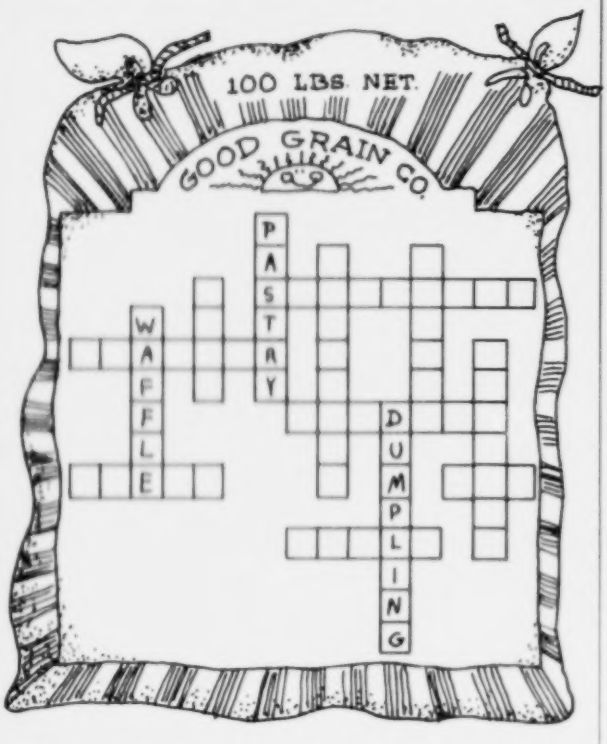
HOW ABOUT A BATH? In this special "wheat bathtub", stones drop to the bottom and other light materials float away. Now, we wheat kernels are nice and clean.



DOWN THE "FLOUR" PATH. First, wheat kernels like me go between heavy rollers with grooves that break the grain up into pieces.

GIANT SIEVE. After each of many trips through the rollers, the wheat pieces are shaken through a series of screens to make them finer.

FILL THE FLOUR SACK



THE FLOUR SACK above is filled with all kinds of good things to eat made from wheat. How many of the items listed below can you fit into the correct spaces? We've done the first three to get you started. Answers are on the back.

Pastry	Rolls	Cereal	Cracker	Spaghetti
Waffle	Bread	Cake	Noodles	Macaroni
Dumpling	Bun	Biscuit		

CEREAL ANYONE? Russell's stocked up with plenty of wheat cereals. Wheat's a favorite breakfast food all over!

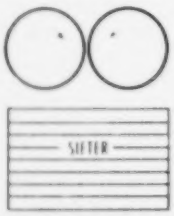
WHEAT... BREAKFAST OF COUNTRY KIDS

SHREDDED wheat, puffed wheat, bran flakes, wheat flakes...lots of cereals are made from wheat.

Cereals made from wheat and other grains are very popular at America's breakfast tables. How popular? Well, people in the United States eat more than *20 billion* bowls of cereal every year! Farmers have to grow a lot of grain to make that much cereal.

Country Kid Russell, above, is holding just a few of the ready-to-eat cereals

WINDY WHEAT! Another fancy sieve at the mill uses air currents to blow the bran from the rest of the wheat.



IT'S A GRIND. It's no simple job for us wheat kernels to become flour. These smooth rollers grind the wheat finer and finer.

WHOLE LOT OF SHAKING. These huge sifters have as many as 27 screens, each with smaller openings than the one before it.

WHEAT

made from wheat—did you know there were so many different kinds to choose from? Next to oats, wheat is the grain most often used to make cereals.

Ever wonder how wheat becomes cereal? There are five steps in making most ready-to-eat cereals: cooking, forming, drying, flaking or puffing and toasting.

Here's how it's done:

First, wheat flour and other ingredients are measured into a large cooker heated by steam. Then the cooked mixture is formed into small, round pellets, which are spread out on a belt and partly dried by hot air.

Next, the pellets are flaked or puffed.

To flake them, the pellets are sent between two large, heavy rollers that flatten them into flakes.

To puff them, the pellets are put into a covered container and heated. Heating makes the water left in the pellets turn to steam and expand, filling each pellet with thousands of tiny air holes.

After the cereal has been shaped into flakes or puffs, it's still moist, so, finally, the cereal is toasted to make it completely dry and crisp.

Then the cereal's all set for your breakfast or a snack. Let's get the milk and enjoy a bowl of cereal right now!

Farmer Invented Reaper

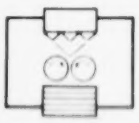
IF *COUNTRY KIDS* had been around more than 150 years ago, we might have featured a farm boy named Cyrus McCormick as a "Country Super Star"!

Cyrus was only 15 when he started making inventions to help farmers like his dad...and one of his inventions is among the most important farm machines ever—the mechanical reaper.

Before Cyrus invented his reaper, farmers had to cut wheat by hand.

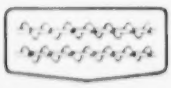
Cyrus had the idea that if he used a knife with a saw-toothed edge and made it move back and forth while the grain was held against it, the knife would cut the grain just like a saw cuts wood. And Cyrus was right!

FASTER. Cyrus' reaper could cut 8 acres of wheat in a day. By hand, farmers could cut only 2 acres.



NOW, REPEAT AFTER ME. Purifier—roller—sifter; purifier—roller—sifter. We wheat kernels repeat these three steps until we're mostly flour. Most wheat becomes flour, but some, mostly bran and germ, is used to make animal food.

GETTING OLDER. Years ago, new flour was stored to make it better for baking and to whiten it. Now, a special ingredient does that job.



ENRICHING. The miller adds B-vitamins and iron to most white flour, since many Americans don't get enough of those important nutrients.

WHO GETS THE DOUGH?

WHEN the price of bread goes higher, some people say that it's the wheat farmer's fault. But they don't realize the cost of wheat has very little to do with the cost of bread. Did you ever wonder where the money really goes when your family buys a loaf of bread?

These days, a 1-pound loaf of white bread costs about 53¢. But the farmer gets only about 4¢ of that for the wheat in the bread. And the farmer gets only another 1¢ for other farm products in the bread, like shortening and milk.

All the rest of the money—about 48¢—goes to *other* people.

Look at the chart below to see where the 53¢ goes when your family buys a loaf of bread at the store.

The Store Gets 9¢

The Baker Gets 35¢

The Miller Gets 1¢

The Farmer Gets 5¢

Other People Get 3¢

MAKE A FARM ANIMAL FROM WHEAT FLOUR

WHEAT FLOUR is great for baking a cake—but you can use it to have fun, too! By mixing flour and water into a paste and dipping newspaper strips into it, you can make your own papier-mache craft.

You can make just about any farm or ranch animal using papier-mache. Maybe you'd like to make a little porker, as Country Kid Pam is doing on the next page.

Materials Needed

Flour, Water, Newspaper
Balloons (1 large and 1 small)
Paper towel tube, Masking tape

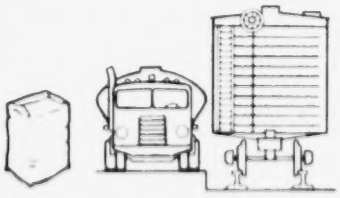
Directions

1. Mix 1 cup flour and 1 cup water until you have a creamy paste. If paste is too thick, add a bit more water.

2. Blow up large balloon for animal's body and small one for head. Knot ends.

3. Rip newspaper in big strips 2 x 6 inches and small strips 1 x 3 inches. (Don't cut newspaper. Tearing gives it a ragged edge that helps make paste stick.)

4. Dip big newspaper strips one at a time in flour paste on both sides. Rub strip along edge of paste bowl to take off extra paste. Paste strips over each balloon until balloon is completely covered. Smooth out



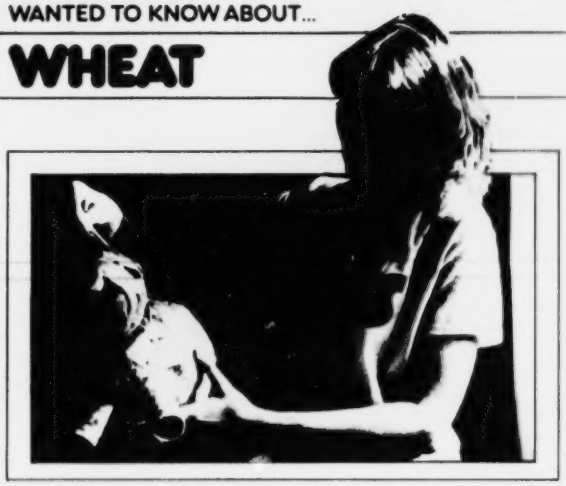
READY FOR BAKING. Well, now we've been through the mill. Flour leaves the mill in many ways—from 2-pound bags like you find on the grocer's shelf to big railroad cars.

Gosh, that tour made me hungry. I'm going to the kitchen to get a thick slice of fresh bread...how about you?

Tour chart: Adapted from Wheat Flour Institute Diagram

EVERYTHING YOU EVER
WANTED TO KNOW ABOUT...

WHEAT



WHEAT FUN! Pam uses wheat paste to make cute pig.

each strip of papier-mache as you put it on. Let balloons dry.

5. After balloons are completely dry, tape head to body.

6. Make legs from paper towel tube and tape to body. Cover legs and tape with small strips of papier-mache. (Note: You'll need to mix up a fresh batch of flour paste after each drying period.) Tape any items you want on head—such as ears, snout or horns—depending on what animal you're making. You can make snout from piece of paper towel tube, and ears and horns can be cut from cardboard. Cover snout, ears, etc. with small strips of papier-mache. Let dry.

7. Pop balloons with pin.

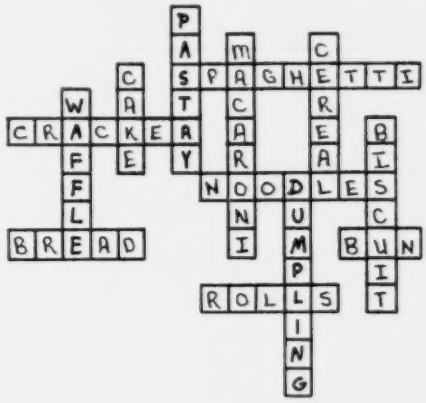
8. Later, cover entire animal with another layer of papier-mache, using big strips for body and head and small strips for ears, snout, etc. Let dry.

9. When completely dry, paint the entire animal with poster paint. Glue on yarn or other material for tail, mane, etc.

Now you have a colorful animal to set on a shelf in your room—or to give as a gift! (Be sure to clean up after you've finished making your animal.)

Wheat sure comes in handy, doesn't it?

Answers to the "Fill the Flour Sack" puzzle



Answers to the type of wheat quiz:

Hard Red Winter and Spring—hard rolls, yeast breads.

Soft Red Winter and White—cookies, quick breads, cakes, pastries, crackers, snack foods.

Durum—spaghetti, lasagna, rigatoni.

Extra copies of this 16-page booklet are available from the Kansas Wheat Commission for 30 cents each. Many other educational pamphlets, films and videocassettes about all areas of the wheat industry are also available. Contact:

kansas wheat commission
2630 Claflin Road
Manhattan, KS 66502-2743
913-539-0255

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